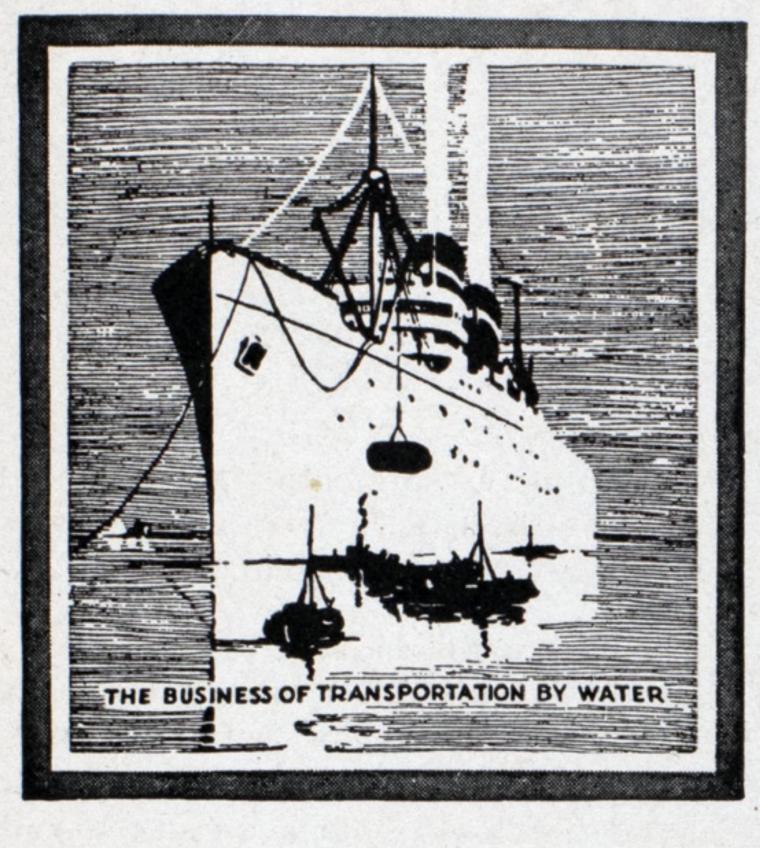
Marine Review

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« EDITORIAL »

Don't Delay Completion of United States Liners

OTHING should be allowed to prevent or delay the successful completion of the two transatlantic liners now under construction at Camden, N. J., for the United States lines. Like a bolt out of the blue came the startling news that the shipyard had stopped work on these vessels and laid off 1600 men. Though no definite reason was assigned at the time by either the shipyard or the United States lines, later developments suggested the question of finances. Contracts for loans from the shipping board on new construction specifies payment by the owner of the first 25 per cent of the cost of construction out of private funds. In the case of the new United States liners this amount is the substantial sum of not less than \$5,-250,000.

According to reports as this is written,

the shipping board has wisely agreed to waive the strict requirements of the contract permitting funds from the federal loan to apply before the complete outlay of the 25 per cent required of the owner, on the guarantee of P. W. Chapman, president of the United States lines, that all of the required investment by the owner would be made during the course of the construction of the two vessels. In view of the circumstances this seems to be a reasonable concession on the part of the board and its action is to be commended for carrying out the true spirit of the merchant marine act in giving practical co-operation in bringing about the prompt resumption of work.

The people and government of the United States are committed to practical encouragement and support of an American merchant marine and it is inconceivable that any circumstances can arise which would mean the abandonment of this policy. The dramatic cessation of work on the two leading units in the furtherance of this program has had the ef-

fect of drawing the attention of the country thus helping to consolidate and strengthen support for an American merchant marine. It will serve to buck up resistance to insidious propaganda that we would do better to let nations who are apt in the business of shipping carry our goods for us. We believe that the average American's attitude in a minor crisis such as this would be an increase to determination to see it through.

What Owner's Risk Meant

that any clause in the bill of lading specifically warning the shipper that his goods are carried, in certain special circumstances, at his own risk does not mean that he is absolved from providing a seaworthy ship properly operated. Circumstances do arise, however, in which the shipowner feels so certain that he is not liable that he is willing to make an issue of it.

An exceptionally interesting case of this character was decided against the ship-owner, though on the face of it he seemed to have the better of it.

The shipowner agreed to transport a quantity of linseed oil on the basis of a contract of shipment which provided that the oil was to go in the steamer's deep water ballast tank and that the shipowner should not be liable for leakage from this tank after it had been accepted by the surveyor of the shipper's underwriters; and that the oil was specifically accepted at the owner's risk and subject to the terms of the bill of lading which was of the usual form subject to the Hague rules.

The shipowner, complying with the contract, employed a reputable concern to repair leaks in the tank making it ready for the oil cargo. As is customary in cases of this kind, after completing work on the tank, hydrostatic tests were made which showed that the tank was watertight. After examination the designated surveyor for the shipper accepted the tank and the shipment was made. Upon arrival at the port of destination it was discovered that much of the linseed oil had been lost because of leakage. This leak-

age it is found was due to the use of white lead in making the structure tight; the linseed oil having dissolved the lead. The shippers claimed damage which was denied by the shipowner under the terms of his contract and the shipping company brought action in court, winning its case.

The shipowner contended with what seems to be some justice, that having given the job of repairing the tank to a reputable and experienced concern and having had the tank accepted by the surveyor for the shipper, he was not liable for any loss resulting. But the court took a different point of view and this case is therefore of unusual interest in showing the far reaching effect of that clause referring to due diligence in making a vessel fit to carry cargo. It is clear that the repair work on the tank was not properly done. This responsibility the shipowner could not escape. Someone representing him should have insisted on a better and more thorough job on the part of the shipyard doing the repairs.

Able Steamship Operators

IFFICULT though it may be, if building up a merchant marine meant only the design and building of first class ships and their operation in an efficient and intelligent manner we could feel that the problem had been largely solved. It is very important to put skillful and experienced thought into the planning, building and operation of ships. But there is far more to the making of a permanent and successful merchant marine than this. We have to be good salesmen, diplomats, traders, ever elert to render service always ready to make good our own mistakes and by attention to detail reduce the possibilities of mistakes to a minimum.

Finance must enter into it, but here as a nation we have a brilliant record. Finding money for huge enterprises is not uncommon, when they promise big returns, which shipping rarely does. In building up a really successful merchant marine we must develop daily application to small details and work for close and cordial cooperation with the shipper. His needs and wishes must be studied and every effort must be made to serve him well.

An American Transatlantic Enterprise A Real Success Nearly Sixty Years Ago

By W. L. Harms

HEN they were on the right track after all, that time, just sixty years ago!

For this new chapter of the International Mercantile Marine's career, the creation of a great ocean shipping system, to be emphatically American, is but the realization of the ambition that inspired the promoters of the original Philadelphia enterprises of the early 1870's.

Since 1858, when the Collins line collapsed, the pessimistic theory had been gaining ground that ocean shipping was not a field in which American steamships could hope to prosper, or even pay their way. This unfortunate attitude would seem to have been justified by the course of events. The Bremen line had gone out with the Collins line. Commodore Vanderbilt himself disposed of his maritime interests in the earlier 1860's to take up railroading. His immediate competitor on the Atlantic, the older Havre line, which appears to have been perhaps the most ably managed of all those early American lines, succumbed at last in 1867; it had carried on for forty-five years, having started back in 1822 as a sailing packet service, turning to steam at the close of the 1840's when it acquired the Havre mail contract rights of the Bremen line. And the several attempts during the 1860's to establish

new Atlantic lines of American nationality lasted no more than a year or two each.

One venture of American origin of that decade did prosper and wax to eminence. This was the Guion line, a revival in steam of the old Black Star line of sailing packets. But it operated under the British flag.

So, in 1870, when the American commercial interests concerned in the New Orleans-Liverpool trade sought to satisfy their need of a steamship service by themselves organizing one, they felt it advisable likewise to maintain it with British steamers. This enterprise subsequently branched out into the Canadian trade, becoming known as the Dominion line.

Philadelphia Enters the Contest

At Philadelphia, however, where a similar movement gathered headway the following year, the American flag was not at all considered so hopeless a business proposition.

That port had formerly enjoyed considerable distinction as being a transatlantic terminal, the Inman line itself having begun business in the Philadelphia-Liverpool trade. But that company discontinued its Philadelphia calls in 1857 upon entering the New York trade. Thereafter the former port was quite deprived of direct transatlantic service by high class

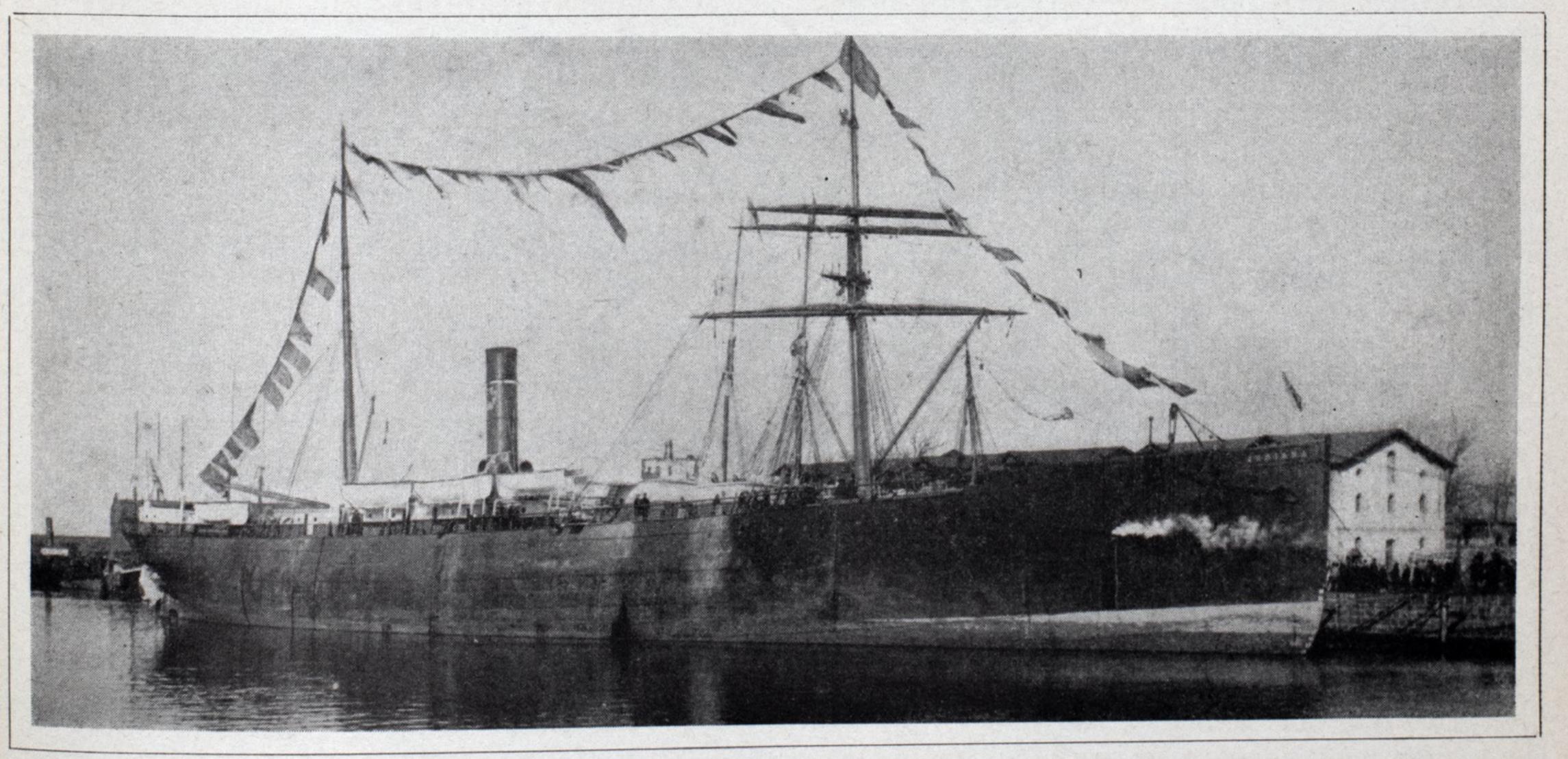
liners, a loss that was felt keenly by its business people.

Therefore when at last the Pennsylvania Railroad Co. sought co-operation toward the creation of a new Atlantic steamship line out of Philadelphia, in the prospect of augmenting rail traffic through the port as the effect of such an institution, it was altogether successful in enlisting the substantial support of the local merchants in the project.

There was organized, then, at a capital of \$2,500,000 an undertaking to be known, like that earlier Boston line, now defunct, as the American Steamship Co., for which the charter was obtained April 18, 1871. A high-class mail, passenger, and freight service between Philadelphia and Liverpool, with the customary call at Queenstown, was the object. The significant feature of these proceedings was the decision to maintain the service with modern iron screw steamers of American build and registry.

The first step taken was toward the creation of a fleet of liners. The new company contracted with William Cramp & Sons' Ship & Engine Building Co., Philadelphia, for the construction of four suitable vessels.

Much has been heard of the famous ships of the old Collins line, how their (Continued on Page 52)



S. S. Indiana at Libau, Russia, with Cargo of Food for Starving Russians, March, 1892

S. S. PRESIDENT COOLIDGE

New Dollar Liner Is Launched

A AMERICAN merchant marine is in the making. On Feb. 21 at the yard of the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., Mrs. Calvin Coolidge christened the second of the Dollar Steamship lines' \$8,000,000 turbine electric liners, the President Coolidge. The launching took place shortly before noon, the new vessel taking the water easily without a hitch of any kind. A bottle of water taken from a brook in Plymouth, Vt., the boyhood home of the former President, was used for the christening ceremony.

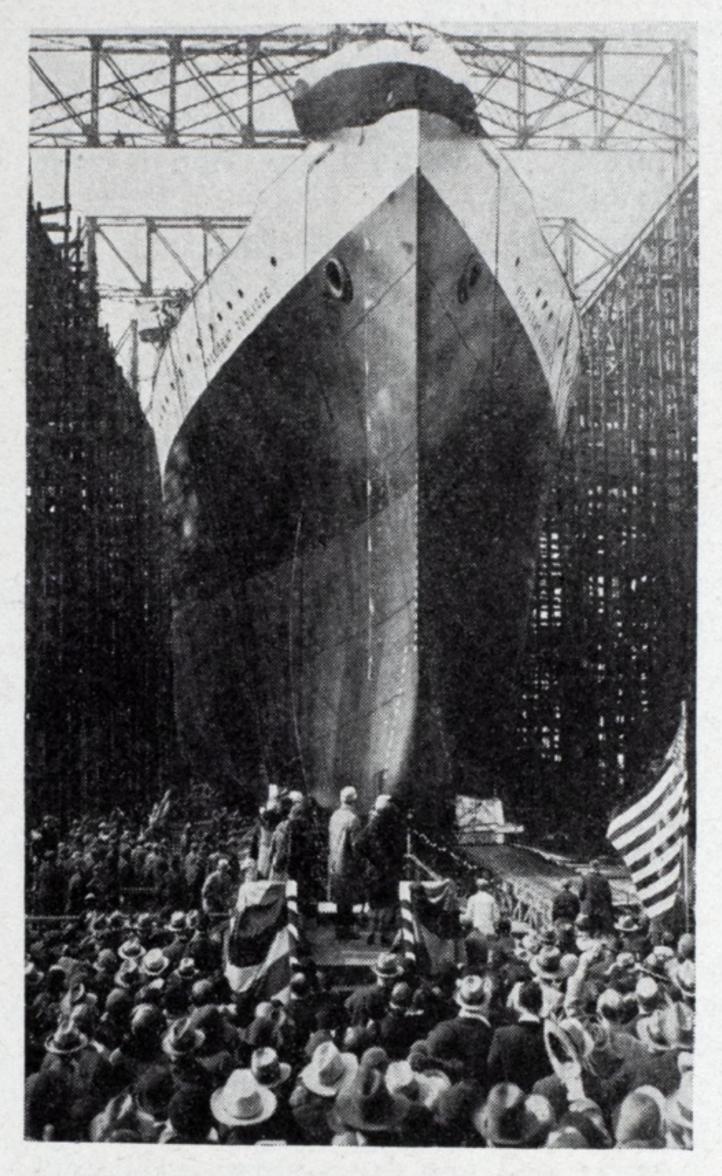
The first vessel in this program of the largest and most modern and palatial merchant vessels so far turned out in an American shipyard was launched on Dec. 9 at the same yard, Mrs. Hoover, acting as sponsor. A story of this launching, including technical data, was published in MARINE REVIEW for January. The S. S. Presi-DENT COOLIDGE is the sister ship of the PRESIDENT HOOVER in size and accommodations. The turbine electric machinery however was designed and built by the Westinghouse Electric & Mfg. Co. and is this company's largest unit for a merchant vessel.

Fleet of Four Ships Planned

The two vessels now launched are the forerunners of a fleet of four vessels. Two similar vessels will be laid down late this year. The new vessels will also be named after presidents of the United States.

The two new liners will enter service, the first in August, the second in the fall, on the run from New York to the Pacific coast and the Orient. After the launching of the President Coolidge a luncheon was tendered the guests by the shipyard at the Tidewater club. It was during the speech at the luncheon that R. Stanley Dollar, president of the Dollar Steamship lines mentioned the building of two additional ships.

The S. S. PRESIDENT COOLIDGE is the twentieth of the Dollar Steamship lines' fleet of president liners which ply to the Orient and round the world over a route touching 22 world ports in 14 different countries. R. Stanley Dollar is president of the Dollar Steamship lines, founded by Capt. Robert Dollar, the grand old man of American shipping, who is still active at 87 years as chairman of the board of the lines. The new liner just launched will be ready to enter the New York-Manila run in October of this year. She will give a weekly service with other units of the Dollar



S. S. President Coolidge launched at Newport News Shipbuilding & Dry Dock Co., just before noon, Feb. 21, 1931

Steamship lines from New York to the Philippines via Havana, Canal Zone, Los Angeles, San Francisco, Honolulu, Yokohama, Kobe, Shanghai and Hongkong. The fortnightly service around the world has been in operation for the past seven years, touching at the ports just mentioned and also at Manila, Singapore, Penang, Colombo, Suez, Port Said, Alexandria, Naples, Genoa,

The S. S. President Coolidge

General Particulars

Length over all, feet. Length on waterline, feet. Length between perpendiculars, feet. Beam, molded, feet. Depth molded to shelter deck, side, feet. Depth molded to upper deck, side, ft., ins. 42-6 Load draft, designed, feet. Draft for scantlings and subdivisions, feet. Displacement at designed load draft (tons). 33,800 Deadweight capacity 34' draft (tons). 17,400 Cargo, general (cubic feet). Cargo, refrigerated (cubic feet). Propulsion. Westinghouse Turbo-electric Cruising speed (knots). Fuel capacity (tons oil) Boilers (watertube Babcock & Wilcox). First Class Passengers. Special Class Passengers. Passenger accommodations of other classes. 800 Total passenger carrying capacity. 1260
Special Class Passengers

Marseilles and returning to New York. The general characteristics of the S. S. PRESIDENT COOLIDGE are like those of the S. S. PRESIDENT HOOVER and for convenience are set down separately in the accompanying table. Both vessels are propelled by twin screws and have slightly raked stem and semicruiser stern. There are two stacks and masts. The finest possible accommodations equal to the best hotels ashore will be provided in the new ship. There will be such features as elevators, swimming pools, sand beach, gymnasium, children's playroom, soda fountain, veranda cafe, smoking room, library, private dining rooms, tea rooms, music and dance salon, talking picture theater, shopping lobby, broadcasting system, stock exchange rooms. beauty parlor, automobile garage, telephones in every room, and any other convenience to be found in a leading metropolitan hotel. The heating and cooling systems serving the ships will be of the most modern construction, capable of providing a given tempera-

Superb Accommodations Provided

ture to an exact degree.

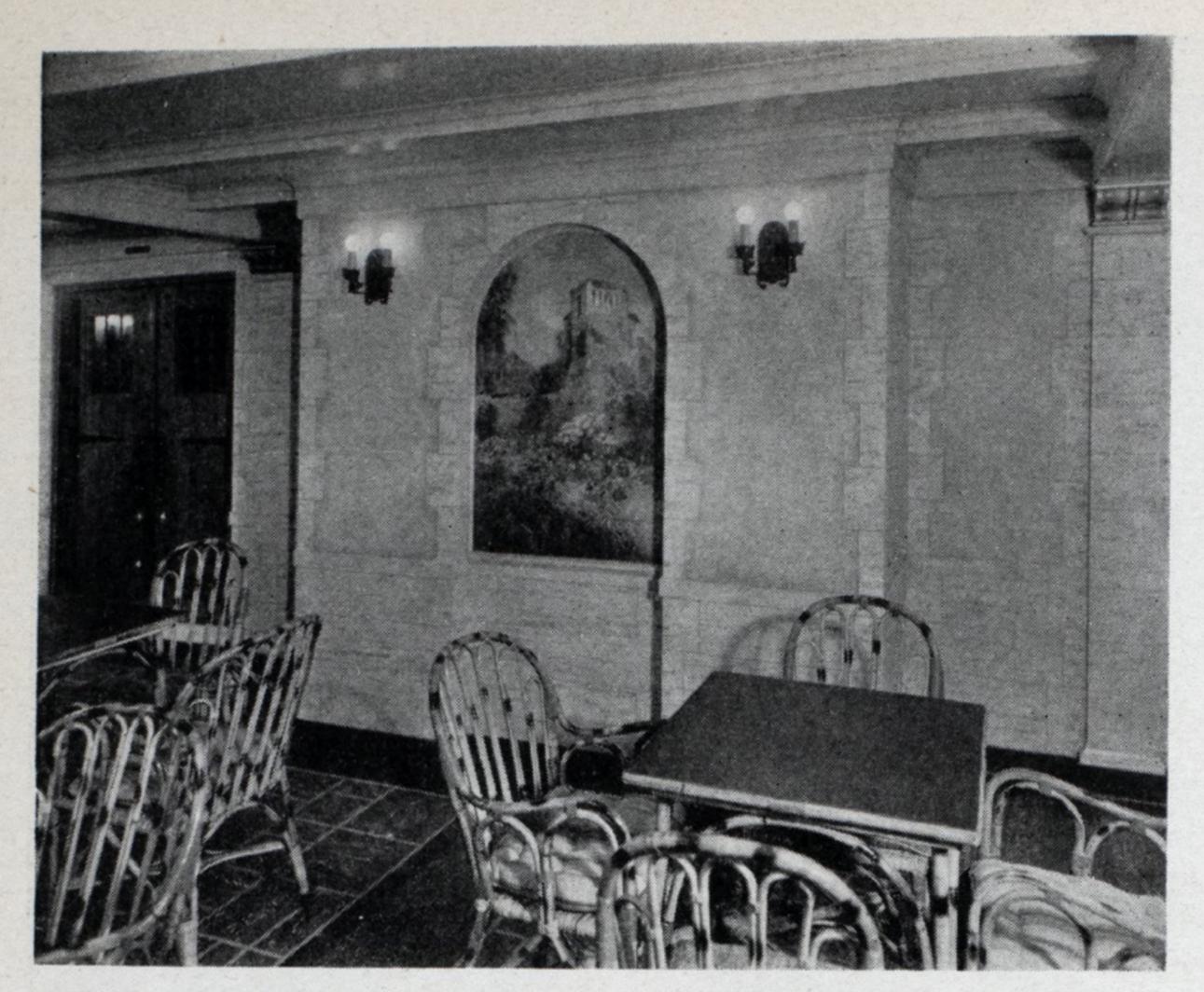
The main dining salon will accommodate the entire first class passenger list of 320 at one sitting. Four deluxe suites consisting of a sea veranda, living room, bedroom and bath are located amidships on the first passenger deck. These suites will be arranged and decorated with all the care and skill possible using the highest talent. The tapestries, hangings and furnishings, it is said, will surpass any similar rooms afloat today.

The propelling machinery, designed and built by the Westinghouse Electric & Mfg. Co. consists of the following: Two 10,200 kilowatts at 2660 revolutions per minute turbine generator sets, the turbines designed for 275 pounds throttle pressure, 200 degrees Fahr. superheat and 28½ inches vacuum. The main control utilizes mechanically operated air brake contactors and is arranged so that all operations, including turbine speed control and setup connections for operating both motors from either generator alone, is controlled from the station in front of the instrument panel. These two generator sets provide current to two synchronous motors each of 13,250 horsepower at 133 revolutions per minute, 400-volt, 3-phase, and 44.3 cycle. Each of the motors is direct connected to a propeller.

The main turbines driving the generators are provided with the oil impeller governor supplied with oil by a



MARINE REVIEW-March, 1931



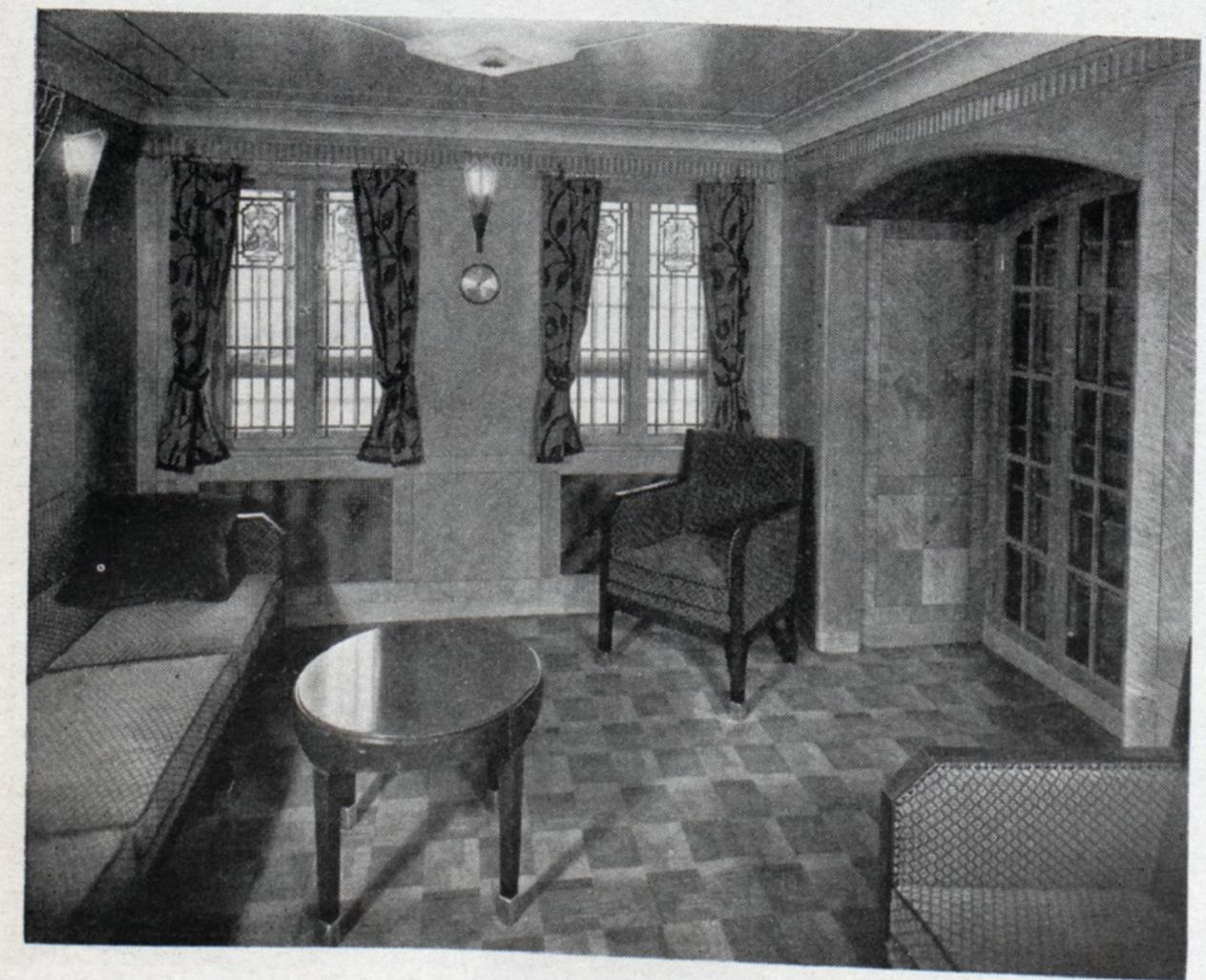
Veranda Cafe

HE single screw turbine geared passenger and cargo liner Borin-QUEN, built by the Bethlehem Shipbuilding Corp. at the Fore River plant, Quincy, Mass., for the New York & Porto Rico line gave an excellent account of herself during sea trials which were held Feb. 18. Over a measured course off the New England coast the new vessel easily attained a maximum speed of 181/2 knots. V. K. Hull, vice president of the New York and Porto Rico line, who was on board during her trials sent the following radio message to the offices of the line in New York; "Borinquen attained speed of 18.5 knots on official sea trials. Engines functioned smoothly at all times and the new liner behaved perfectly throughout various tests. I am certain new flagship will be big

success in the New York, Porto Rico, Santo Domingo run."

Replacing the Coamo as flagship, the Borinquen sails on her maiden voyage on Feb. 26 from Pier 22, Brooklyn, N. Y. for San Juan and Santo Domingo. She will be in command of Capt T. G. Evans, former master of the Coamo. Captain Evans proved his seamanship in a striking manner while in command of the Coamo when he rode out one of the flercest West Indian hurricanes on record. The Coamo is a sister ship in size and power.

Designed by Theodore E. Ferris, New York naval architect, the Borin-Quen cost about \$3,000,000 to build. The new liner was built to the highest class of the American Bureau and to the most rigid standards for safety



Library

S. S. BOR New Porto Enters

of life at sea. She was launched on Sept. 24 and was sponsored by Miss Lillian Hull, daughter of V. K. Hull, vice president of the line. The principal dimensions of the new vessel are: Length overall, 429 feet, length between perpendiculars, 414 feet; beam molded, 59 feet 6 inches; depth molded to hurricane deck 35 feet; depth molded at center deck, 36 feet; and draft to designed load water line, 23 feet 6 inches. Displacement tonnage is 11,000. Luxurious accommodations are provided for 360 passengers. A crew of 154 officers and men are carried.

Speed of 181/2 Knots on Trials

Although capable of over 18 knots as demonstrated on her trials, the Borinquen in her regular run between New York, Porto Rico, Santo Domingo and return to New York, will operate at a cruising speed of 16 knots. Propulsive machinery consists of single reduction geared turbines of the reaction type, built by the Fore River plant of the Bethlehem Shipbuilding Corp. The turbines develop 6500 horsepower and are geared to a single propeller shaft. Steam is supplied by four Babcock & Wilcox watertube boilers arranged for burning oil and suitable for working pressure of 375 pounds per square inch with a superheat temperature of 650 degrees Fahr. The boilers are located in one fireroom. Double bottoms are used for carrying fuel oil and have a capacity sufficient for a steaming radius of 6000 miles or more, equivalent to 17 days' sailing at average cruise speed.

In service the Borinquen will alternate in sailings with the Coamo, thus providing rapid transit for passengers and cargo in both directions between New York and the picturesque and commercially important ports of San Juan, Porto Rico and Santo Domingo city, Dominican republic. Leaving New York on alternate Thursdays the Borinquen will arive at San Juan the following Monday. Sailing Monday night from San Juan she arives at Santo Domingo city Tuesday morning. The return voyage to San Juan is

NQUEN Rico Liner Service

made during Tuesday night arriving early Wednesday morning. On the next day, Thursday, she sails on her return voyage to New York arriving at that port on Monday.

Ventilation and heating were studied with great care in the design of the new vessel. The passenger may himself control both ventilation and heat in his stateroom. An automatic ventilating system insures a continuous flow of fresh air to every part of the ship and for every climatic condition. All public spaces, passenger staterooms, crews quarters, all working storage and cargo spaces are fully and efficiently served by mechanical ventilation. Heating from central sources insures an even and comfortable temperature at all times.

Extensive Refrigeration Plant

To properly handle and care for fruit, vegetables and other perishable cargo which forms the larger part of the tonnage carried, a large refrigerating plant is installed. The holds Nos. 1, 3 and 4, are insulated for carrying refrigerated cargo at whatever temperature may be necessary. lower 'tween decks Nos. 1, 2, 3 and 4 and No. 2 hold and upper 'tween decks are not insulated, but are properly air cooled to the correct temperature for fruit or general cargo. Taking these spaces on the vessel in conjunction with the company's pre-cooling plant on its pier at San Juan, it may be said that a most modern, scientific and efficient handling of perishable cargo has been developed. Every mechanical facility has also been provided for handling general cargo for which a large space is reserved.

In the construction of the Borin-Quen abundant passenger space is provided for comfort and for wide range of interesting activities both indoors and out. Deck space out of doors is unusually extensive without sacrifice of enclosed spaces. She is of the three deck hurricane deck type with forecastle, deck well, bridge enclosure, and continuous deck erections. The decks are described as main, promenade, upper promenade and the boat or

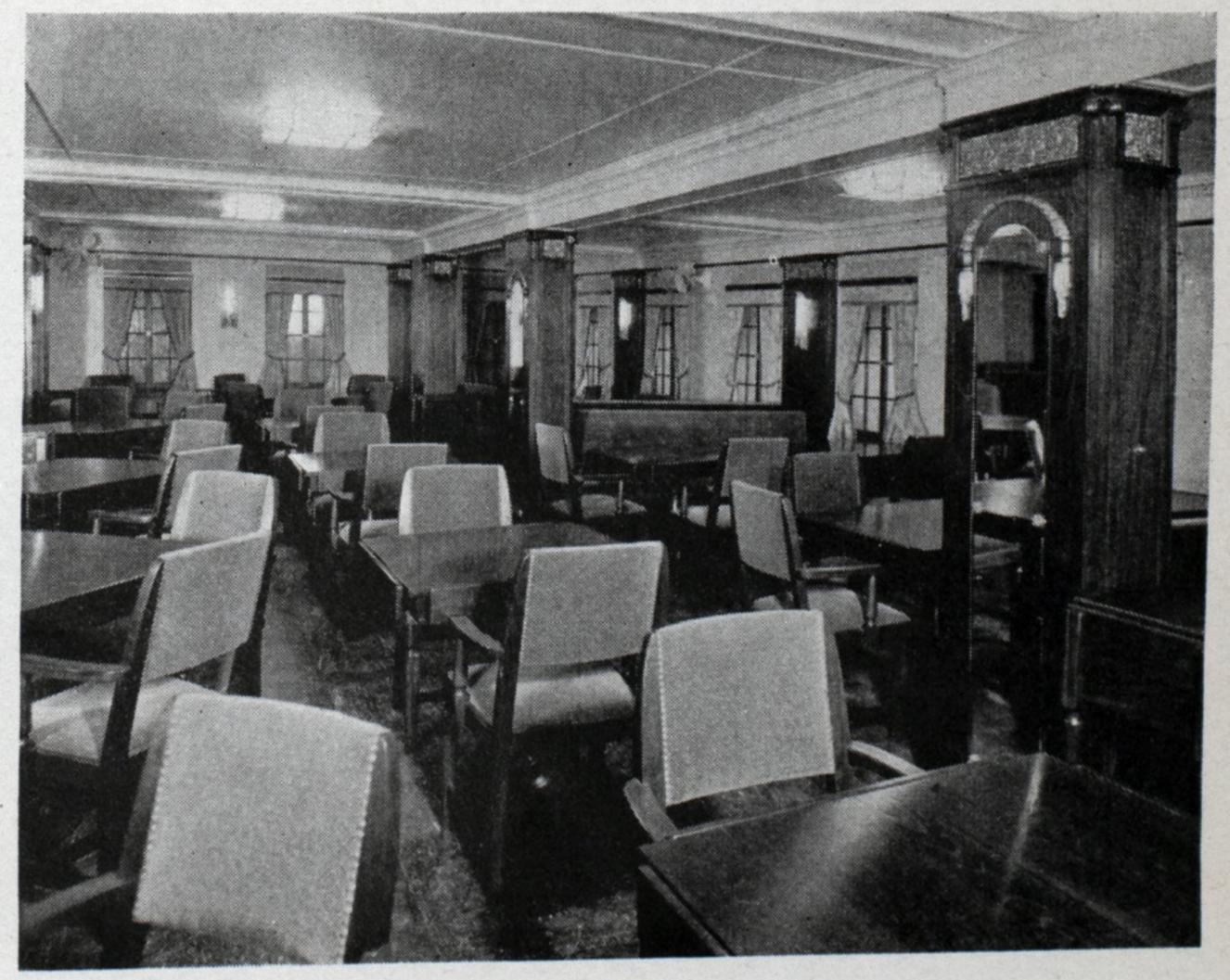


Lounge

sun deck. As is customary in this type of vessel the promenade, upper promenade, boat and forecastle decks are partially plated. These decks as well as the hurricane deck have caulked wooden decks outside of houses. The forecastle also has a caulked wooden deck. On the hurricane deck inside of bridge enclosure and after deck houses, the steel deck is covered with a filler or sub base on top of which is laid cork tile, carpet or other deck covering as specified. Inside of the houses on the promenade, upper promenade and boat decks, a tongue and grooved joiner deck is laid.

The stern is elliptical in shape and the stem raked forward. There are two steel pole masts and the foremost is fitted with cargo booms. Cargo hatch arrangements have been worked out for convenience in quick handling of cargo. There are two hatches through the hurricane, main and lower decks; and one blind hatch at after end of No. 2 hold through the main and lower decks. Blind hatches through the main and lower decks also serve Nos. 3 and 4 holds. Number 1 hatch is trunked from the hurricane to the forecastle deck. Two cargo ports, port and starboard are fitted forward between lower and main decks. Four cargo ports, port and starboard are fitted between main and hurricane decks. There are also two stowing ports, one exit and ventilating port and one main passenger entrance port on each side at hurricane deck.

Seven transverse watertight steel bulkheads, all except after peak bulkhead extending up to hurricane deck, (Continued on Page 56)



Dining Room

Refractory Brick in Marine Boilers

Severe Operating Conditions—Selecting Brick of Good Grade and Quality—Care in Laying Wall—Reduction in Maintenance Costs

Part |

By Lieut. C. A. Griffiths, U. S. Navy

EVELOPMENT in boiler design has proven the usefulness of large furnace volumes for complete combustion of the fuel before the burning gases strike the heated surfaces. In order that the gases of combustion be maintained at the proper high temperatures for complete combustion, it is essential that reflecting surfaces be provided. These reflecting surfaces are the furnace linings which serve the dual purpose of containing the heat within the boiler, providing the radiating walls, and consist of a wall of refractory material backed by a second wall of insulation.

In general, similar problems and considerations in lining a boiler furnace apply to both marine and land installations. Central station plants ashore are comparable to the boiler installations found aboard ship. In practically all respects, however, except for occasional higher temperatures encountered, and the deformation of the brick under the load of its own weight in a high wall, marine boiler brick must withstand more severe operating conditions. Notable among those conditions where marine installations are con-

The second and concluding installment of Lieutenant Griffith's article on the selection, laying and care of fire brick in marine boilers will appear in the April issue.

fronted with more severe conditions than are encountered ashore are: High and unequal rates of firing; the vibration encountered; the tendency of the furnace gases to produce a reducing atmosphere; the working of boiler parts that will occur in a sea way; the rigidity of construction required in boiler casings and supports; the necessity of carefully anchoring each brick to the boiler casing to prevent the wall falling or bulging in heavy weather; and, the limitations generally placed on weight and space.

Sustained Reliability and Economy

The two essential considerations in marine boiler linings are sustained reliability and economy. Reliability is absolutely essential, for, on the wall, may depend the safety of the ship itself; a failure at sea may necessitate shutting down a boiler, loss of steam, and, ultimately, disaster. Economy, in a way, is closely related to reliability in that a scheduled sailing might not be met on account of a sudden failure of a wall. True economy, however, is logically divided into headings: (1) The effect of the boiler steaming efficiency, and (2) The effect of the general maintenance expenses. A poorly layed up wall or a wall of inferior material will soon develop air leaks which will destroy the boiler

efficiency by increasing the excess air content of the flue gases and increase radiation losses by a reduction of the wall's refractoriness. It is in reducing the general maintenance costs, however, that the greatest improvements in economy are possible.

Maintenance costs depend essentially on the life of the brick wall. The three major factors which affect the life of the wall are:

- (1) Method of laying up the wall.
- (2) Grade and quality of brick used.

Each of these major factors are further subdivided into separate considerations which will become of greater importance in proportion as the operating personnel fails to abide by the rules of good engineering practice. The objectives in all maintenance problems are obviously: To reduce repair bills; to reduce the length of the stay of the ship in port; eliminate overtime labor; and, to increase the operating periods between overhauls to a maximum consistent with economical operation.

Repair yards, with the skilled labor at their command, are well prepared to rebrick a boiler with the minimum possible delay. However, no matter how carefully a wall is made up, no matter how excellent is the grade of brick used, the life of the wall will be materially shortened by carelessness in operation and lack of attention by the operating personnel.

Failure of a wall may occur in a port not equipped with the necessary yard repair facilities; or it may occure at sea, and under such conditions it behooves the chief engineer to know exactly what to do and how to do it. In addition to the knowledge necessary to care for the infrequent emergencies which may arrive, the chief engineer should realize the various factors which enter into the life of a brick wall in order that by careful supervision he may reduce the maintenance expenses of his ship. For it is only by the reduction of the operating costs to the absolutely minimum that steamships can successfully compete with motor vessels and not show a balance "in the red."

The standard fire brick is 9 x 4½ x 2½ inches. Where the require-



Fig. 1—Furnace wall after oil fired to 3000 degrees Fahr. Excellent grade of brick carefully made up, smooth face, thin even joints. Bonding property of clay excellent

ments are such that the boiler must occupy a minimum of space and weight, the bricks are installed with the 9 x 21/4-inch face exposed to the gases, giving a wall depth of 41/2 inches. In other service, where weight and space are not such vital factors, the bricks are generally installed so as to give a depth to the wall of 9 inches. Behind the refractory brick an insulating wall about 5 inches thick is generally installed. Insulating brick has a low thermal conductivity which resists the passage of heat and permits more or less uniform heating throughout the refractory brick. It should never be directly exposed to the heat of the furnace, however, for it has a low melting temperature and a large coefficient of expansion and would soon fail.

There are many satisfactory methods of laying up a wall and a far greater number of unsatisfactory ones. An approved method consists of the following steps:

Steps in Laying Up Wall

(a) The clay or cement used to bond the bricks should have similar refractory and expansive characteristics as the brick in order to avoid unequal expansion and fusion. The mortar should be a good grade of this clay or cement finely ground and thoroughly mixed with water to the consistency of paint. The proper consistency of the mortar can be judged by lifting the upper of two bricks having a thin layer of mortar between them. When the lower brick, as it is quickly lifted, just tends to lift with the upper brick, the consistency is approximately correct. A thick mortar will result in thick joints, which are to be avoided; too thin a mortar will have poor bonding qualities.

(b) After ensuring the brick to be free of chips and cracks, dip it first in water and drain off. Then dip one end and one side in the mortar, avoiding air bubbles, and allow the excess mortar to drain off. Place the brick in position on the wall and tap into place until a thin joint from which no more mortar can be forced out is obtained. Do not use mortar on a trowel on bricks in place on the wall. A thick joint must be avoided, and with properly mixed mortar, joints as small as 1/32-inch can be obtained. As the brick is the actual refractory and the cement primarily the bonding element, the efficiency of a furnace wall has, therefore, been said to be only as good as the joints.

(c) Care must be exercised in preventing the edges of a brick to protrude beyond the face of the wall; that is, the entire face of the wall should be smooth and flush, with no projecting corners or bricks.

(d) Furnace floors, for oil fired



Fig. 2—Poor resistance to fusion. Good resistance to shrinkage and cracking. Wall well made up. Bonding property of clay is excellent. Brick of incorrect composition

boilers, should be covered with about 4½ inches of diatomaceous earth next to the plating. This is then covered with a double layer of split brick with staggered joints. No mortar is necessary to hold the floor bricks in place but dry fire clay should be swept over each course of split brick to a depth of about 1/8-inch ensuring that all joints and cracks are filled.

(e) Each marine boiler brick should be anchored. The temperature from the furnace as far back into the wall as the bolt head is so high that ordinary iron or steel bolts usually fail due to reduced tensile strength from burned heads. Satisfactory service has been obtained from nickel-manganese alloy bolt material containing about 4 per cent manganese.

(f) Expansion of the brick, particularly in the case of flooring, must be allowed for at the ends of the walls or floor at a rate of 1/8-inch to the foot of length. The rigidity of marine boiler casings demands this in order to prevent bulging of the floor or wall on an increase in temperature.

(g) After the wall has been completely layed it should be allowed to thoroughly dry and the mortar to set by a good circulation of air through the furnace. A slow fire then lighted will further dry it out and strengthen the bond.

(h) After the wall has been thoroughly dried out a light wash, consisting of the mortar used in laying, considerably thinned out, should be applied with a brush. This will fill up any small cracks that devel-

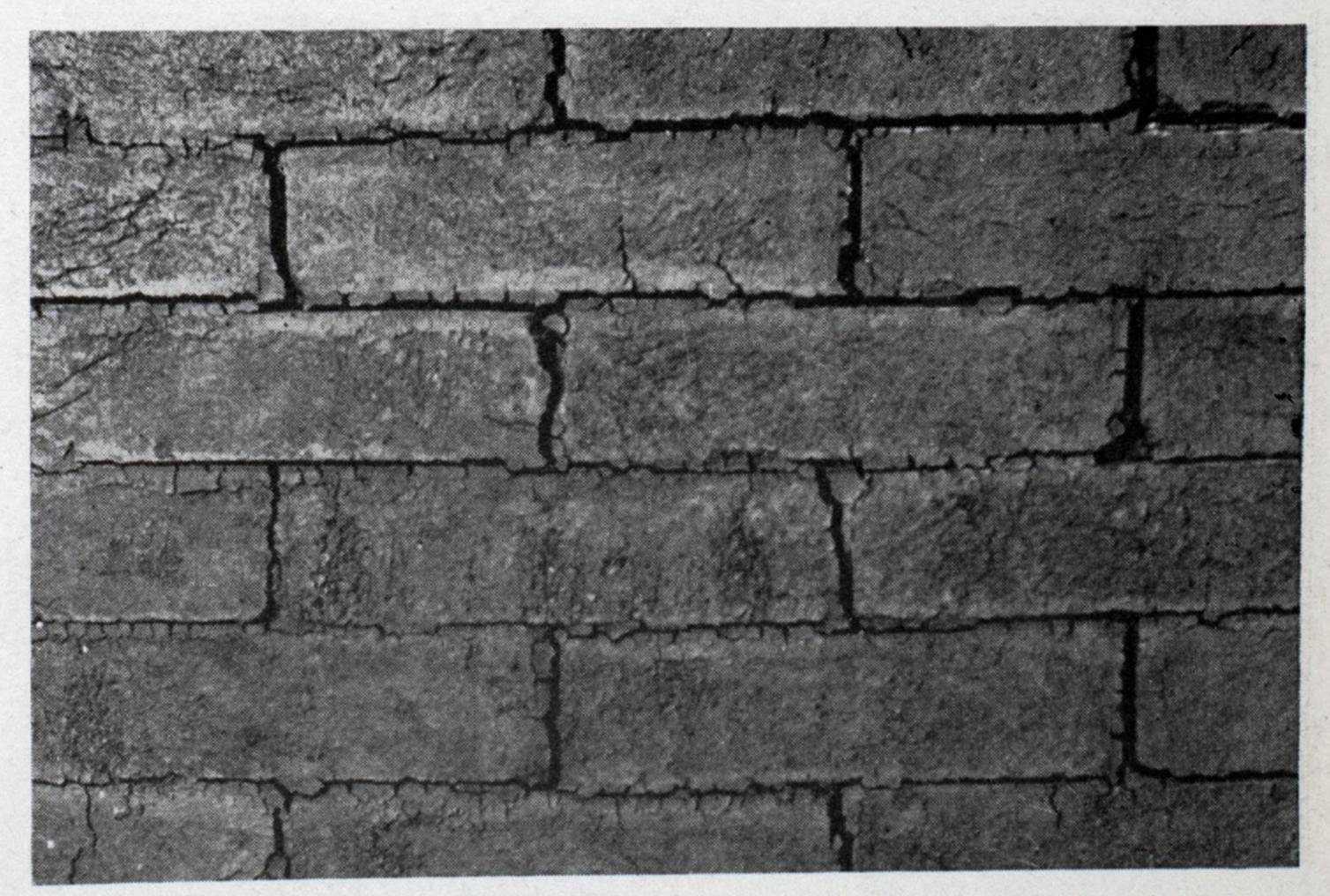


Fig. 3—A furnace wall showing poor resistance to shrinkage. Good resistance to fusion. Wall well made up. Evidence of excessive shrinkage in clay

oped during drying and will form a light protective coating for the wall.

The boiler is then ready for use. Fig. 1 shows a section of a furnace wall made of excellent brick, carefully made up, that has successfully withstood high rates of firing in an oil fired furnace. This wall encountered temperatures up to 3000 degrees Fahr. and appears to be in as good condition as when originally layed.

Marine boilers should use only the best quality of fire clay brick of which there are many on the market. The composition will vary within wide margins, but in general, it is composed of approximately 50 per cent silica, 40-45 per cent alumina, 2 per cent iron oxide, and the remainder titanium, magnesium, calcium, and other oxides in small amounts.

The relative values of a hand made brick versus a machine made brick is a debatable question. In each case certain advantages are claimed; a hand made brick is believed to be more homogeneous, whereas a machine made brick should be more even in its dimensions. All brick during manufacture must be well burned in order to develop strength and a finely grained structure. The brick as received must be free of cracks, and voids, and the corners must be sufficiently strong to resist crumbling in handling.

In service a fire brick is subjected to certain conditions which tend to shorten the life of the brick and cause failure regardless of the care used in installing. The most important characteristics which a fire clay brick must possess are:

Under high rates of steaming furnace temperatures as high as 3000 degrees may occur. The brick must be able to withstand these high temperatures without softening or fusing. Fig. 2 shows a wall made up of brick, satisfactory in all respects, shrinkage, cracking, spalling, etc., except resistance to fusion. This wall was as carefully made up as the wall shown in Fig. 1. Near the top right side, tears of melted brick are beginning to form, while on the left side the wall has completely fused. Lack of resistance to fusion may be due to a number of closely allied causes; the manufacturing processes; the mixture of the clay; the composition of the original clay; fluxes in the clay; the atmosphere within the furnace; impurities in the brick; and other reasons. Any or all of these characteristics cause the brick to fail.

The entire failure of a brick wall by bulging and subsequent collapse may be due to excessive expansive characteristics of the brick. A fire clay refractory brick is the result of a compromise between clays of different analyses; the two necessary ingredients common to all suitable fire clay materials being silica and alumina. These are found in various proportions in clay deposits in different sections of the country. They are analysed and mixed in an endeavor to obtain the proportions which have been found most desirable, namely, 50 per cent silica and 40-45 per cent alumina. Generally speaking, alumina in a fire clay brick

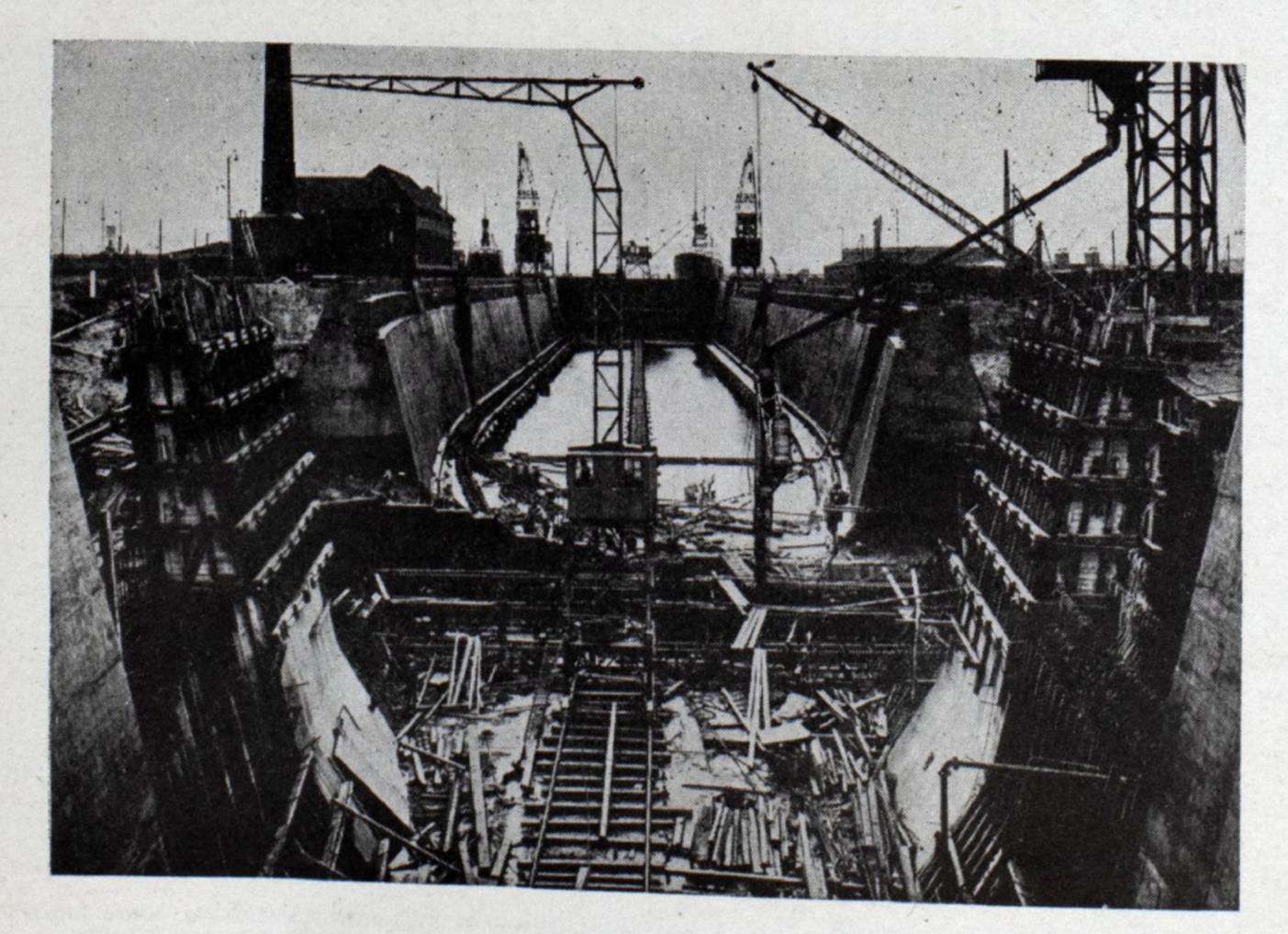
causes contraction, whereas silica causes expansion. In a well proportioned brick these factors balance each other and the changes in volume during use are correspondingly small. When improper proportions are used, shrinkage of the brick is liable to occur.

A furnace wall made of brick having poor resistance to shrinkage takes the appearance of the section of wall shown in Fig. 3. This particular brick was satisfactory in regard to grain structure, strength. and had excellent resistance to fusion, but the excessive shrinkage showed it to be undesirable for marine purposes. When shrinkage occurs to a lesser extent than is shown in this illustration, small surface cracks may develop. In either case the result is harmful to the boiler lining, the strength of the wall is reduced; insulation is destroyed; and, as it admits air into the furnace it results in decreased boiler economy. (To be Continued)

Annual Dinner of Schools

The annual dinner for the Cleveland navigation and engineering schools of the Lake Carriers' association, was held at Hotel Hollenden, Cleveland, on Feb. 11. George A. Marr, vice president of the association, presided as toastmaster. Of the 61 students enrolled in the navigation school, 32 were seeking original licenses and 29 a raise in grade, and in the engineering school 25 were working for original licenses and 21 for raise in grade.

Extending Dry Dock at Bremen to Over 1000 Feet



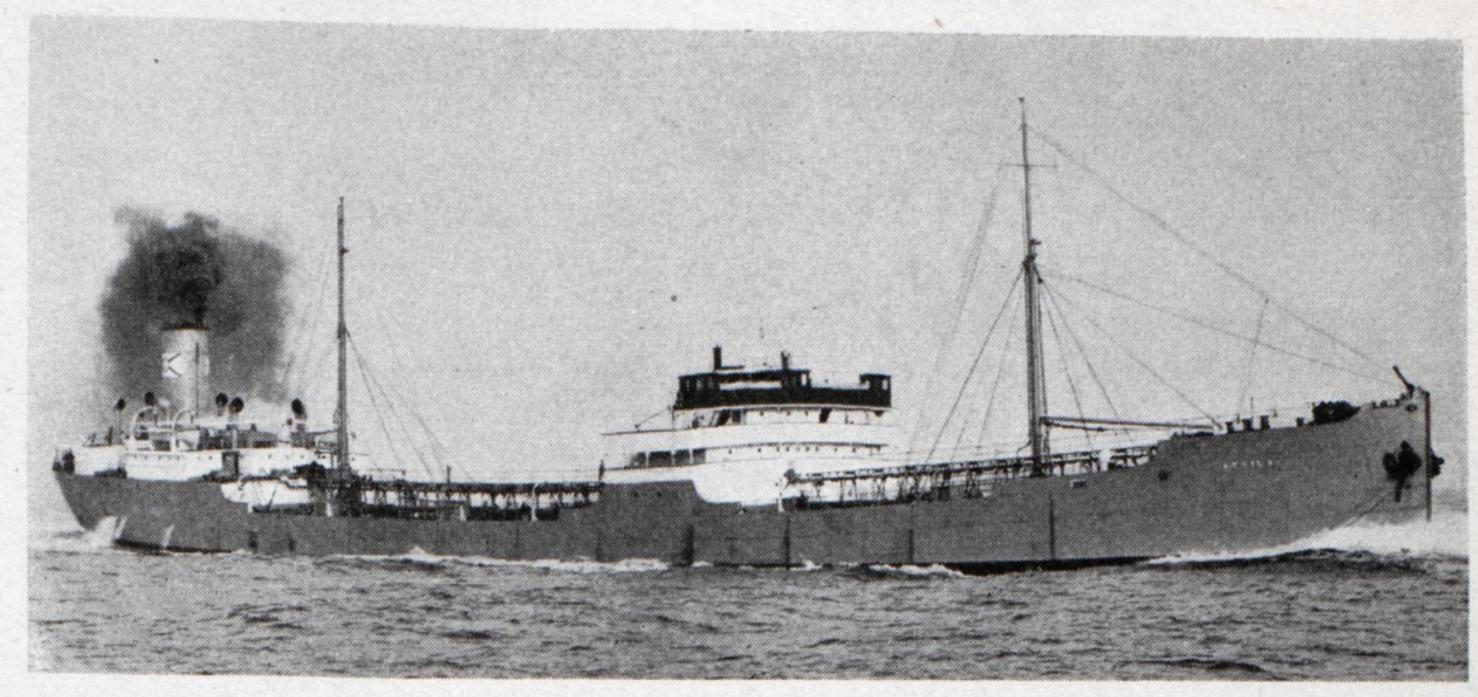
HE great harbor at Bremen, Germany, is a scene of bustling activity these days for work is being pushed on the Kaiserdock II, which is being extended to a length of 335 meters or more than 1000 feet. This added length will make it the greatest dry dock in all of Europe and will enable it to accommodate vessels up to 75,000 British registered tons. The greatest German vessels are the Bremen and Europa of about 50,-000 British registered tons.

Foreign Diesel Tankers and Cargo Ships

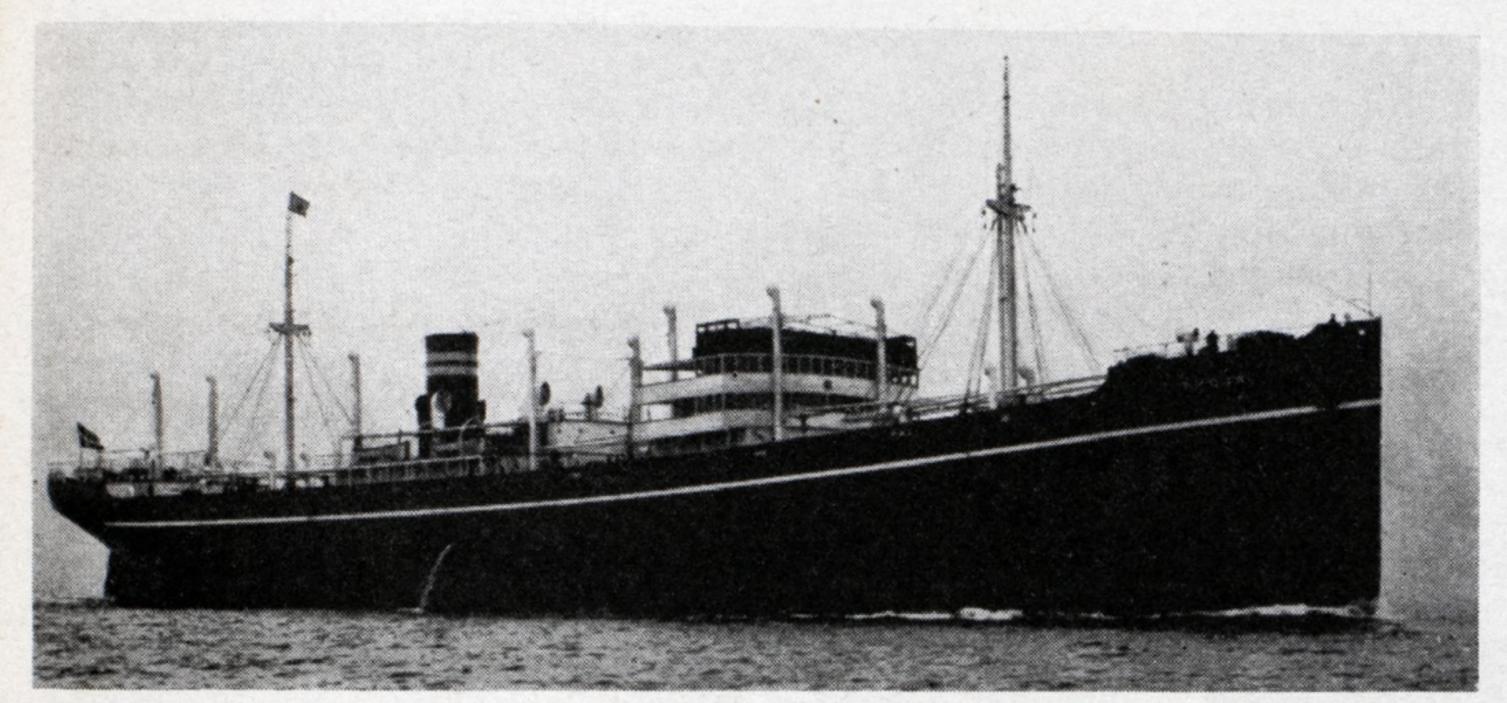
M. S. Attila

Owner Alf Jakhelln
Builder Sir W. G. Armstrong Whitworth & Co., Ltd.
Trial trip
Speed @ 125 r.p.m., knots
Length overall, feet, inches
Beam molded, feet, inches
Deadweight, tons
Classification I loyde class
Classification, Lloyds class + 100 A-1
Number of propellers1
Main drive diesel, 2 cycle, s.a
Armstrong diesel, Sulzer patents
R.P.M. (nominal)
B.H.P. M 125 r.p.m3000
Auxiliaries Steam Driven
Boilers, cylindrical type, oil burning2
One boiler arranged for using waste gases
Naval Architects-Arnesen, Christensen & Smith-
field, Ltd.
Compressor and scavenging nump driven by main

Compressor and scavenging pump driven by main engine, other attached pumps, lubricating, bilge, sanitary and lubricating pump for crosshead.



Single Screw Diesel Tanker Attila Built in England for Norwegian Owner

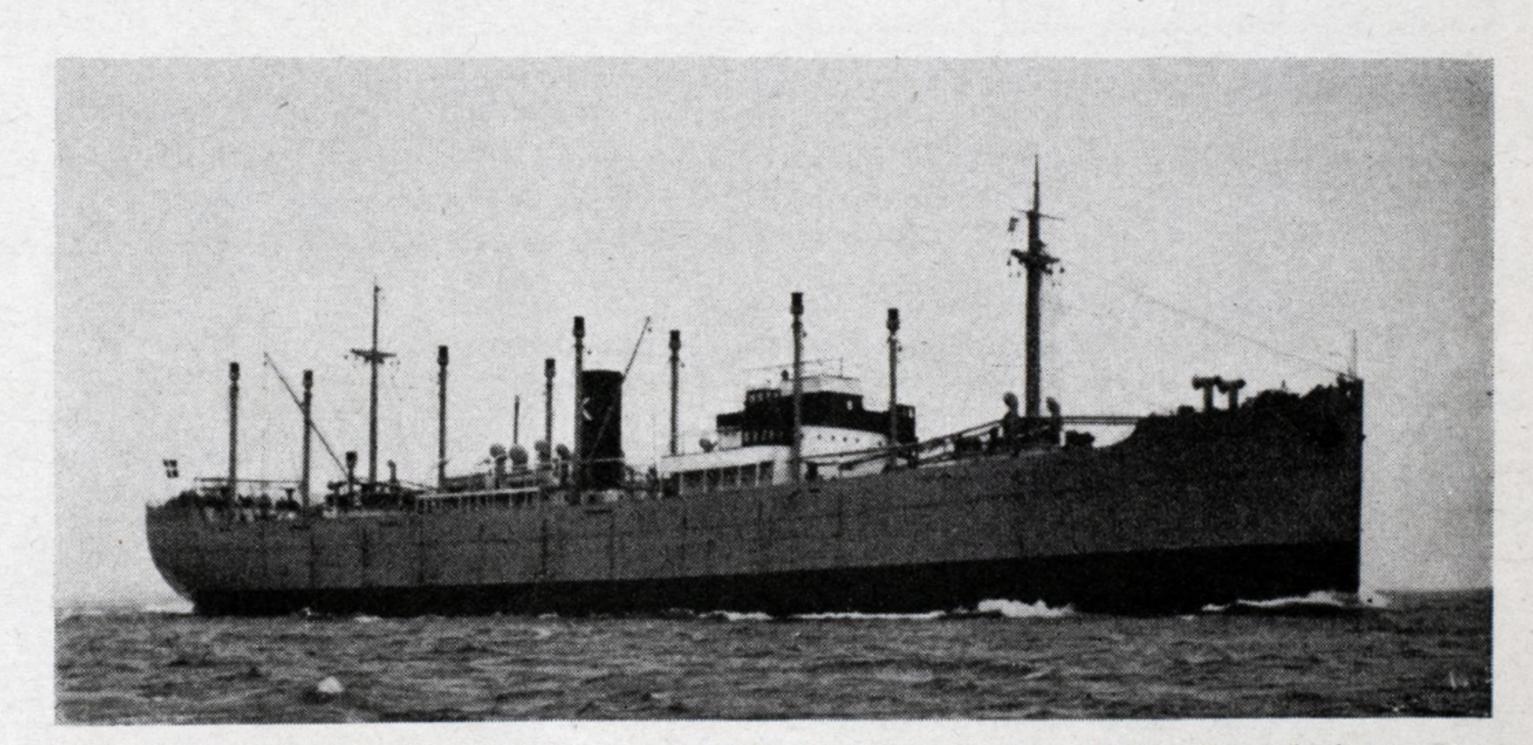


Twin Screw Diesel Freighter Troja, Built in Denmark for Norwegian Owner

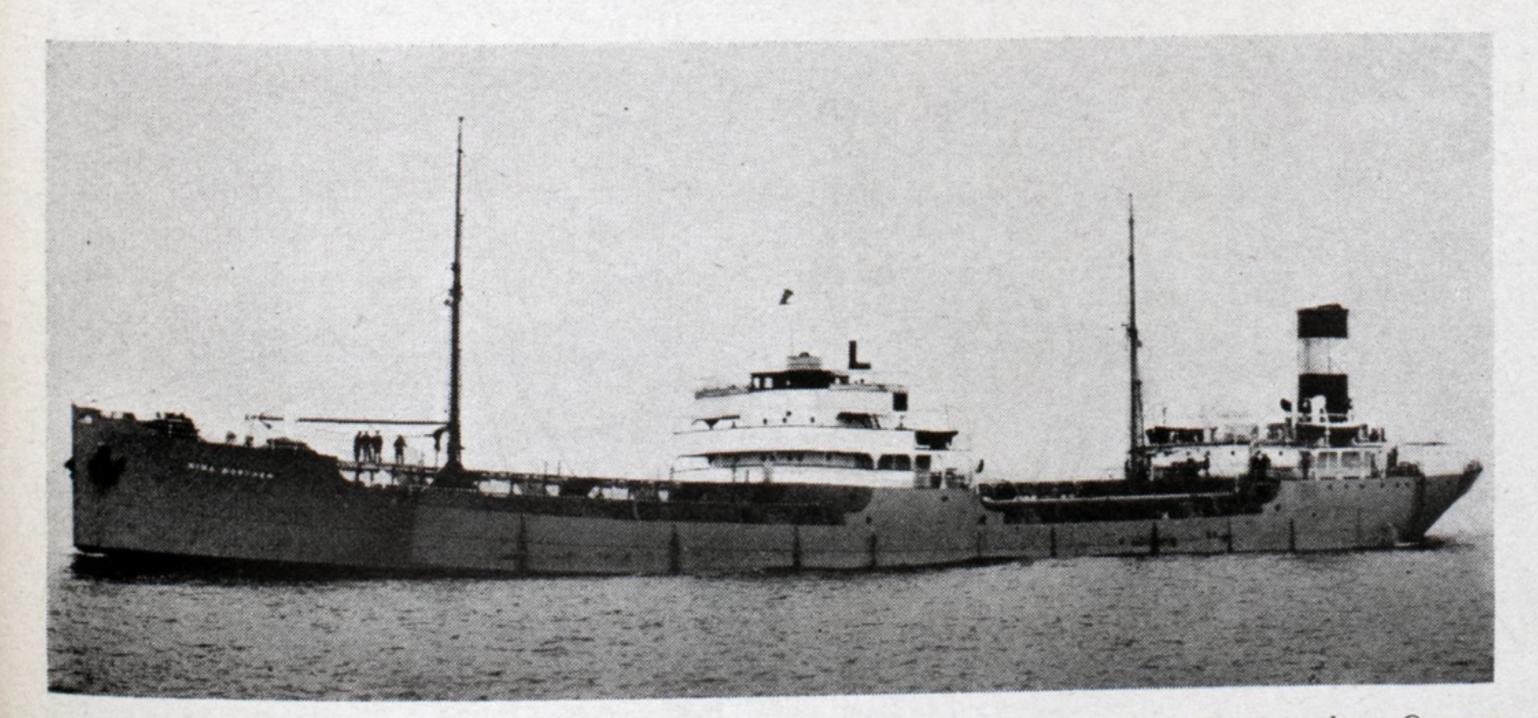
M. S. Troja

M. S. Granville

Owner
D '11
Builder Odense Steel Shipyard
Speed, at sea, loaded, knots
Length b.p.p., feet, inches
Beam, molded, feet, inches
Depth, molded to shelter d'k., feet inches38-6
Depth, molded to main d'k., feet, inches29-0
Draft, summer freeboard, feet, inches25-7
Deadweight, tons
Cargo capacity, bales, cubic feet519,000
Classification, Norwegian Veritas Highest
Number of propellers
Main drive diesel engines, 4 cycle, s.a. B. & W2
R.P.M. (nominal) each propeller
I.P.H. (nominal) each engine
Auxiliana dissal and D o W
Auxiliary diesel engines, B. & W
Fuel oil capacity, tons
Cargo winches, number
Deale and It
Deck auxiliaries Electric driven



Twin Screw Diesel Freighter Granville, Built in Denmark for Danish Owner



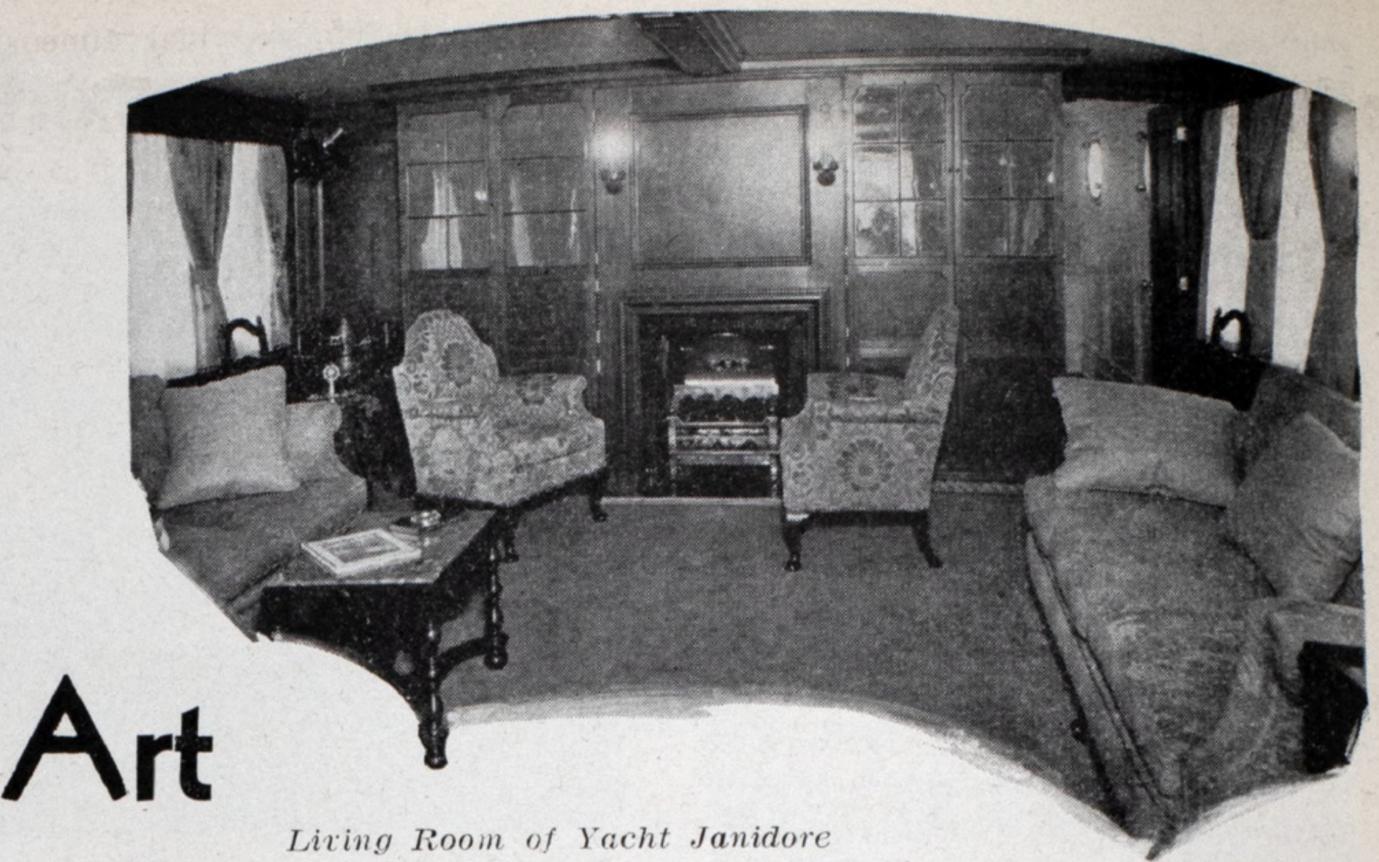
Single Screw Diesel Tanker Nina Borthen, Built in England for Norwegian Owner

M. S. Nina Borthen

Owner
Roilers, one single ended, cylindrical oil burner,
for harbor duties. One small Cochrane vertical waste heat boiler for steam at sea.
Compressor and scavenging pump driven by main engine. Other attached pumps, cooling water, lubricating, bilge and sanitary, and lubricating pump for crosshead.

Steel Yachts Promote

Shipbuilding Art



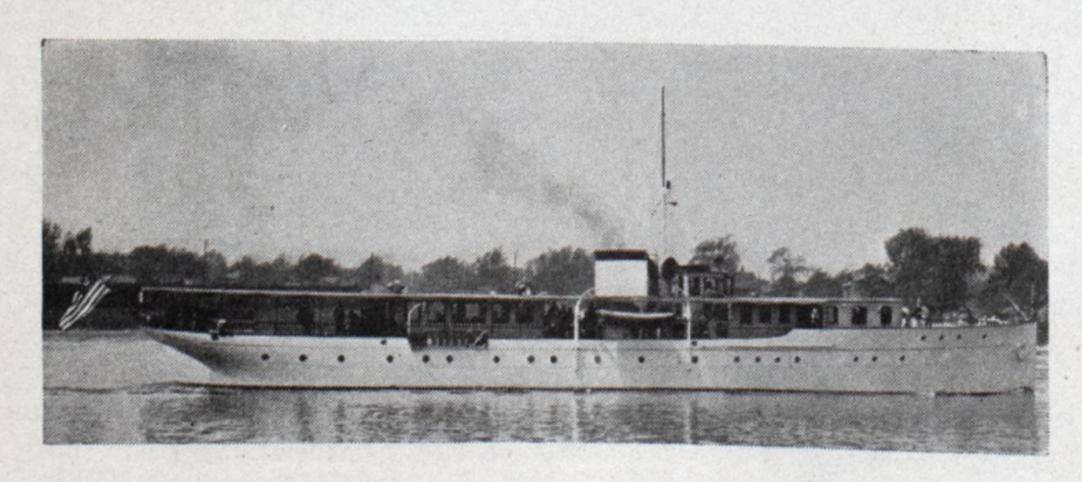
NE of the outward expressions of the great wealth of the United States is the marked, indeed it may be called phenomenal, increase in the building of large steel yachts. The activity in this class of shipbuilding during the last three to four years may well be the wonder of the rest of the world, and there seems to be

Twin Screw Steel Diesel Yacht Thalia-Speed 16 Knots

no cessation in the demand. In size and elaborateness of powering and equipment these yachts are ocean going ships and in their design and construction represent the application of highly trained skill.

The Corsair, new Morgan yacht, for instance, is 343 feet 6 inches in length overall, has a molded beam of 42 feet 8 inches and is driven by twin screws by means of electric motors receiving 6000 shaft horsepower from two turbine generating sets. The total cost of this magnificent vessel is estimated to have been \$2,500,000. Certainly the designer and the shipyard who can turn out a vessel of this class have been given a real test in skill and experience.

Accompanying illustrations show five new steel yachts, built during 1930 by Defoe Boat & Motor Works, Bay City,



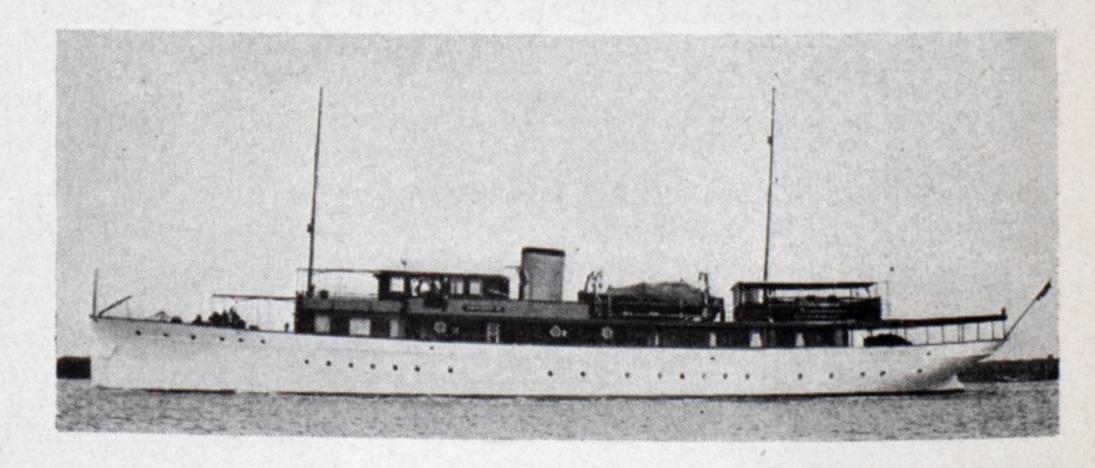
Twin Screw Steel Diesel Yacht Elda-Speed 18 Knots

Mich. They range in length overall, from 160 feet to 118 feet and in beam from 24 feet 6 inches to 18 feet, 8 inches. They are all twin screw and of diesel direct drive.

Saramar III *

THE SARAMAR III is owned by Charles T. Fisher, Detroit, and was designed by John H. Wells, Inc. Completed in July, 1930 her principal dimensions are: Length overall, 153 feet, breadth molded, 24 feet, draft, 9 feet 6 inches, gross tonnage, 360, net tonnage, 245. The hull is of steel. The houses, decks and all deck trim are of teak.

The main drive consists of two 6-cylinder, 14 by 16 inches, 400 horsepower at 325 revolutions per minute, Winton diesel engines, each direct connected to a propeller. The Saramar III is a beautiful yacht of what might be called the more conventional design with counter stern. The speed is 13 knots. Equipment includes Sperry navigational aids including gyro compass and automatic steer-



Twin Screw Steel Diesel Yacht Saramar III-Speed 13 Knots

er. Radio sending equipment and direction finder were furnished by the Radio Corp. The windlass was supplied by the American Engineering Co. and is electric motor driven, the propellers were supplied by Hyde Windlass Co. Refrigerating machinery is of the Brunswick-Kroeschell type. Auxiliary generators, diesel driven, and the pumps, were furnished by the Winton Engine Co.

Thalia •

THE THALIA is owned by Thomas M. Howell and was designed by Tams, Inc. Completed in Oct. 1930, her principal dimensions are: Length overall 160 feet, breadth molded, 24 feet 6 inches, draft, 8 feet 8 inches, gross ton-

nage, 386, net tonnage, 262. The hull and houses are of steel and the decks and exterior trim are of teak.

The main drive consists of two 6-cylinder, 14 by 16 inches, Winton diesel engines of 500 horsepower each, direct connected to propellers. One of the distinguishing features is the new cruiser type of stern. The speed is 16 knots.

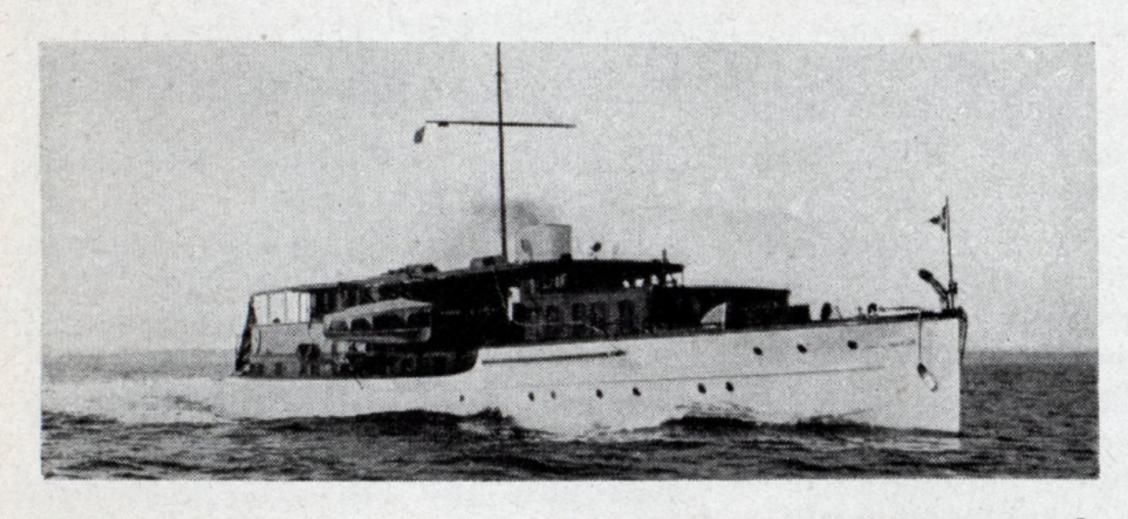
This vessel is fully equipped to go in any weather on any sea should it be necessary. The steering gear is of the Sperry type. The wireless sending equipment and direction finder were supplied by the Radio Corp. The propellers were made by the Hyde Windlass Co.; the windlass by the American Engineering Co. and the pumps by the Nash Engineering Co. The electric driven windlass is of American Engineering Co. make. Auxiliary diesel engine driven generators were furnished by the Winton Engine Co. Refrigeration is of the Frigidaire type.

Sheila •

THE SHEILA, owned by George W. Loft, New York, was designed by John H. Wells, Inc. Decoration was supervised by Harriet E. Brewer. Completed in July, 1930 her principal dimensions are: Length overall, 118 feet, breadth molded, 18 feet 8 inches, draft, 5 feet 4 inches, gross tonnage, 161, net tonnage, 110. The hull and trunk are of steel. The deck houses, the main deck and all exterior trim are of teak.

The main drive consists of two 8-cylinder 8½ by 12 inches, solid injection Winton diesel engines, each developing 400 horsepower at 700 revolutions per minute. The speed is 15 knots.

This vessel is also of light construction and is built



Twin Screw Steel Diesel Yacht Sheila-Speed 16 m. p. h.

primarily for inside use with a large forward cockpit and exceptionally cool and well ventilated cabins and deck houses.

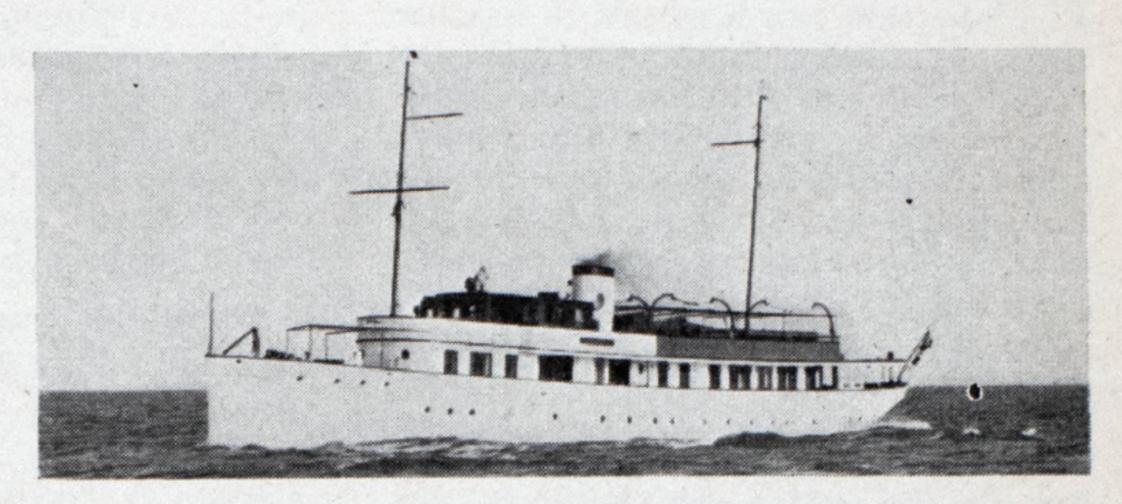
◆ Janidore ◆

THE JANIDORE is owned by I. Zellerbach, San Francisco, and was designed by John H. Wells, Inc., with John Quinn as decorator. Completed in August, 1930 her prin-

cipal dimensions are: Length overall, 143 feet, breadth molded, 24 feet 6 inches, draft, 9 feet 6 inches, gross tonnage 320, net tonnage, 217. The hull and houses are of steel. The decks and exterior trim are of teak.

The main drive consists of two 6-cylinder, 11 by 14 inches, Winton diesel engines of 450 horsepower each, of solid injection type. Each engine is direct connected to the propeller. This vessel has particularly roomy accommodations suited for long stays on board. The speed is 13 knots.

Like the others she is fully equipped for sea going voyages, with complete Sperry navigational aids including



Twin Screw Steel Diesel Yacht Janidore-Speed 13 Knots

the steering gear. The pumps were supplied by Nash and the windlass by Aallan Cunningham. The propellers are of Hyde make. Refrigeration is of the Frigidaire type. The auxiliary generators are driven by Union diesel engines. The radio sending equipment and direction finder were supplied by the Radio Corp. On her maiden voyage the Janidore made the trip from Bay City, Mich. to San Francisco under her own power.

◆ Elda ◆

THE ELDA is owned by Arthur V. Davis, New York, and was designed by Cox & Stevens, Inc. Completed in May, 1930 her principal dimensions are: Length overall, 138 feet, breadth molded, 18 feet, draft, 5 feet 6 inches, gross tonnage, 194, net tonnage, 132. The hull and houses are of steel. The exterior trim is of mahogany and the decks are caulked white pine.

The main drive consists of two Winton, 16-cylinder 8 by 10 inches solid injection V type diesel engines of 650 horsepower each at 700 revolutions per minute. Each engine is direct connected to a propeller. This boat is of light construction and has a speed of 18 knots.

The pumps were supplied by the Winton Engine Co. and the windlass by the American Engineering Co. The steering gear is of hand type and the propellers were supplied by the Hyde Windlass Co. Frigidaire equipment is used for refrigeration and the electric generators are Winton diesel engine driven.



Yacht Basin and Shipyard of Defoe Boat and Motor Works, Bay City, Mich.

Marine Terminal Design from the Operating Point of View

Part I*

T IS our purpose in this paper to emphasize the complex considerations that are involved in marine terminal design and to emphasize that the correct solution of the problem involves principally the economics of successful operation-including not alone first cost and fixed charges, but also the cost per ton or per unit to handle, transfer, load, store and get on its way again the cargo, materials and passengers passing through the terminal. economics involved do not stop here, but on the water side embrace the turn around of ships, the length of time involved loading and unloading them, reduction of the cost and the time involved in docking and undocking, and on the land side expeditious and economic distribution in connection with the loading and unloading of railroad carriers, of trucks, lighters, barges, etc.

Solution of the Problem

The successful solution of the problem demands that each of the factors concerned be given proper weight and consideration as it does not follow that a satisfactory result based on one or more factors may not entail burdens and difficulties in connection with other factors out of proportion to the benefits in the one or more cases for which the arrangements may have been nearly ideal. The purposes of a marine terminal are so varied and so many different specialties are concerned in connection with the design, construction and operation of it, that there is the greatest need for cooperation so that all of the special features may be given proper weight. To mention a few of those who should cooperate in the design: the ship designer and ship operator; those involved in handling cargo, stevedores, specialists in loading and unloading; ma-

*This is the first instalment of a paper on Marine Terminal Design from the Operating Point of View, presented before the Society of Terminal Engineers at the Engineering Societies building, 29 West Thirty-ninth street, New York City, Feb. 9, 1931. The authors of this paper are: Frederic R. Harris, rear admiral, C. E. C. U. S. N. retired, consulting engineer; Harry E. Stocker, resident manager McCormick Steamship Co., New York, and contributing editor MARINE REVIEW; William B. Ferguson, consulting engineer; Roy F. Bessey, vice president, Frederic R. Harris Inc., consulting engineers. Published in three parts, the second and third parts will follow in the April and May issues of MARINE REVIEW.

chinery and equipment designing engineers; railroad and other land carriers; to which, perhaps might be added those experienced in the problem of storing and warehousing; the designing engineer; and over all of this some type of business executive coordination that will view the problem in its broadest sense.

Terminals Link Transportation

Marine terminals are links between land and water transportation systems. They are bottle necks wherein a considerable part of the transportation costs are incurred and consequently where proper layout and arrangement of plant may show best results in operating efficiency and where there lies the prospect of finding the greatest opportunities for reducing transportation costs.

A marine terminal may be one that serves largely for the transfer of water borne commerce to land borne commerce—or principally as "through terminal" where ship borne cargo changes to rail borne freight (or vice versa). Another type of marine terminal would be largely "local"—where the destination of ship borne cargo is at or close to the terminal location and the outbound cargo finds its origin similarly. Such a terminal would provide for landward distribution largely by truck and lighter. Actually, all marine terminals are for a combination of both "through" and "local" distribution, generally with a marked emphasis in one direction or the other Marine terminals located in or near large cities with a densely populated hinterland serve principally "locally," with some through traffic. Marine terminals with a sparsely populated hinterland and located at or near small cities are concerned largely with "through" traffic. This distinction is made because the problems involved in the different types are often quite unlike. Marine terminals in a large city like New York are confronted with restrictions as to location and available water frontage, with enormously high real estate costs and consequent high taxes, while a marine terminal of the second type located at or near a small city, say, Mobile, Alabama, for example, is comparatively free from such character of obstacles. These differences in location, conditions and purposes materially affect a proper solution of the problem and make it impossible to lay down any hard and fast rules, preferences, or standards and, often, quite logically, they account for apparent differences of opinion of the designers and operators as exemplified by the structures built. They have influence on such very elementary things as proper pier widths, slip widths, or the use of quays as compared with piers.

This paper is intended to cover, as thoroughly as the available time and space will permit the handling of such a broad subject, the design of marine terminals and to emphasize the need therein for special study, in which study the cooperation of the various specialists or experts involved is essential.

The object of a marine terminal as previously stated, is to provide a link between marine and land transportation. Such a link should be as strong and efficient as it is possible to make it if the transportation system is to function without unnecessary expense or delay. For efficiency, the terminal must provide:

Provisions of Efficient Terminal

Adequate, accessible and safe berthage for ships

Adequate piers, quays or wharves Adequate connections for land transportation facilities (rail, highway)

Adequate space for the handling of cargoes

Adequate and conveniently located space for the storage of goods in transit

Adequate facilities for the loading and unloading of ships, cars, street trucks, and for the interchange of goods between carriers

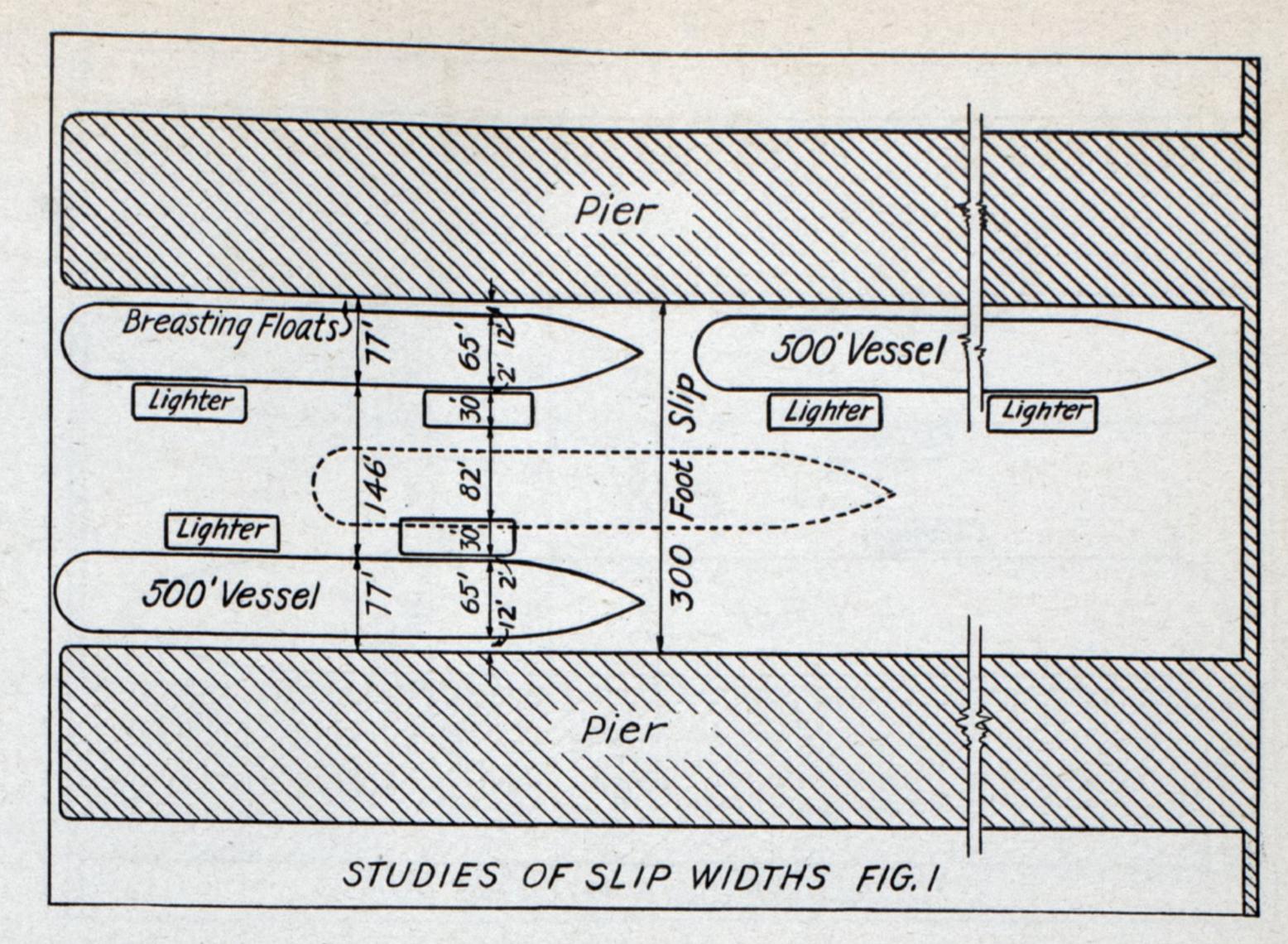
Adequate facilities for the servicing of ships with fuel and water In some cases, adequate and convenient facilities for the transfer of passengers

All of these features must be proportioned and designed for the volume and nature of traffic anticipated, must be properly located and arranged with respect to each other, and must be designed to aid in securing the movement of cargoes and passengers through the terminal with the maximum dispatch and safety at the minimum expense. Cargoes handled at a terminal may vary from several thousand tons loaded or discharged in the case of a single freighter, down to mere hundreds of tons in the case of the coastwise ship at some ports, or to a thousand or two tons of high grade freight, express and mail for a large passenger liner.

In addition, the design must conform to still other requirements geographic, hydrographic, physical, economic, political, real estate, and financial. These are never the same for any two projects. Because of the number, complexity and often conflicting nature of the various factors, it is not practicable to develop a standard or ideal terminal, or even to standardize to any great extent the component parts of a terminal. For example: the ideal terminal for some locations and conditions, with ample land and water areas and cheap real estate might be one with wide slips, wide piers, or quays, single story sheds and warehouses; whereas the ideal in a congested harbor, with high real estate values would be comparatively narrow slips, piers and multistory shed and warehouses due to the necessity of making a fair return on the investment. As another example: a terminal for vessels loading or discharging solid cargoes of several thousand tons of freight and no passengers should be materially different from one designed for vessels carrying several thousand passengers and one or two thousand tons of freight. As a further illustration of this point, the excellent modern terminal at Mobile would be quite out of place on the Hudson at Manhattan Island. Still further, under some conditions the most durable and permanent construction would be indicated, while under others a terminal should be designed for a short intensive use, susceptible of removal when obsolete and replacement on newly developed lines.

Evaluate Factors Involved

For the most accurate evaluation of the various factors entering into terminal design, they should be translated as far as practicable into the logical common term—money: cost of construction, cost of maintenance, cost of operation, and operating revenues. These values should in turn be reduced for comparison as far as practicable to a common time basis: annual costs and revenues, or to a capital value. The broader view should be taken of costs if terminals are to be as sound economically as practicable, that is, effects on transportation costs in connection with vessels, cars, trucks, operating into and out of the terminal and other indirect costs or savings. Any terminal project must be sound economically -it must provide for a suitable return on the investment. In the case of a commercial project the direct return alone must be sufficient. In the case of a public or semipublic project such as a railroad marine terminal, the indirect returns—savings to the community, increases in trade and traffic, industry, real estate valuation, and tax income, may be given great weight.



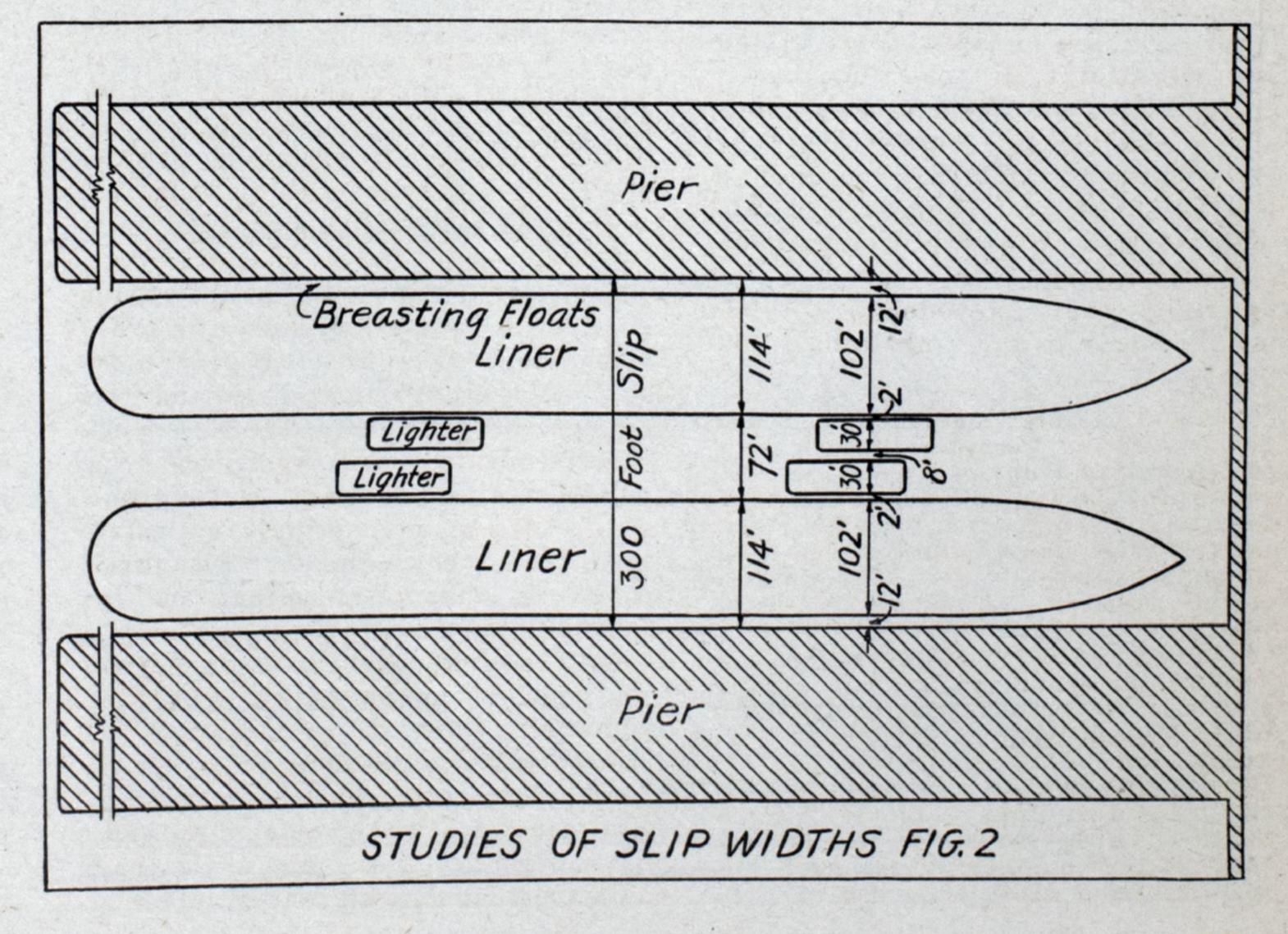
The various features of marine terminals are discussed under various headings to follow, briefly in the case of the more elementary items and at greater length in the case of those most vitally affecting transportation efficiency. In all cases we have tried to place emphasis on points which might indicate possible improvements from the operating point of view—reduction in port time and cost, handling time and costs, demurage damages, property and personal risks.

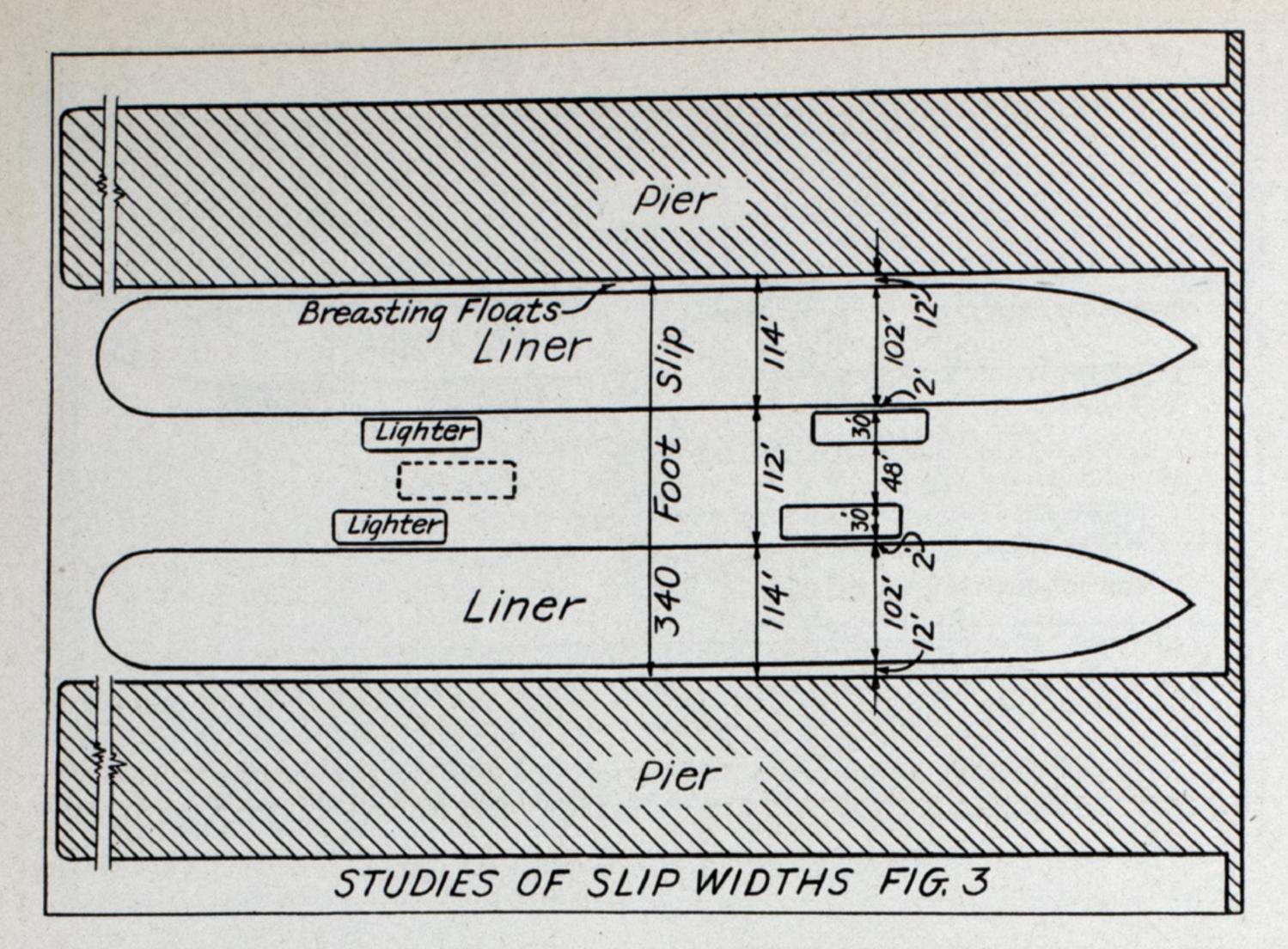
While all design features of a marine terminal, including the structural features, affect the operation in some way, emphasis must be given to those having the more direct effect on efficient operation, especially cargo handling. Such features are: layout and arrangement, dimensions, costs, durability, security afforded (against fire, storm, accident), cargo

handling equipment, railroad facilities and many other details affecting operation.

Guard Against Obsolescence

Some terminals have actually been obsolete in certain particulars the day they were completed due to the lack of thoroughness in studying requirements for the most economical handling of cargo and due to the failure of the designers to give proper consideration to the main purposes for which the terminal has been constructed. Too many engineers design terminals without the assistance of men who have had a broad contact with and an understanding of all the problems involved. Often however, the opinions of men in charge of a terminal are accepted as a sound basis on which to design. Individual opinions should, of course, be carefully analyzed and checked. In





one instance, the study of the problem concerning the number of shipside tracks included discussion with the terminal manager. His opinion of the requirements of stevedores and shipping companies was accepted. As a result the engineers who designed the terminal admitted when the terminal was put in service that a mistake had been made, that two shipside tracks should have been provided instead of one shipside track recommended by the terminal manager.

Must Be Designed for Operation

While structural design is important from the operating standpoint in so far as it affects the terminal usefulness, security, efficiency, and costs in operating and maintenance, it will not be discussed to any great extent.

one instance, the study of the problem concerning the number of shipside tracks included discussion with the terminal manager. His opinion of the requirements of stevedores and shipping companies was accepted. As a result the engineers who designed

Some of the other elementary questions involved in terminal design, such as slips, piers, quays, sheds and warehouses, are touched on briefly as all of these have some effect on the operating efficiency of the terminal.

The most direct effects on the costs of transportation are obviously those of cargo handling facilities and operations and therefore the most consideration should be given to this part of the subject.

We would like to emphasize the fact that, in order to be properly effective, the marine terminal must be operated, and therefore must be designed for operation, as a part of the whole transportation system and with all of its functions in view, rather than as a pier or wharf, the design of which is based on tradition (or in

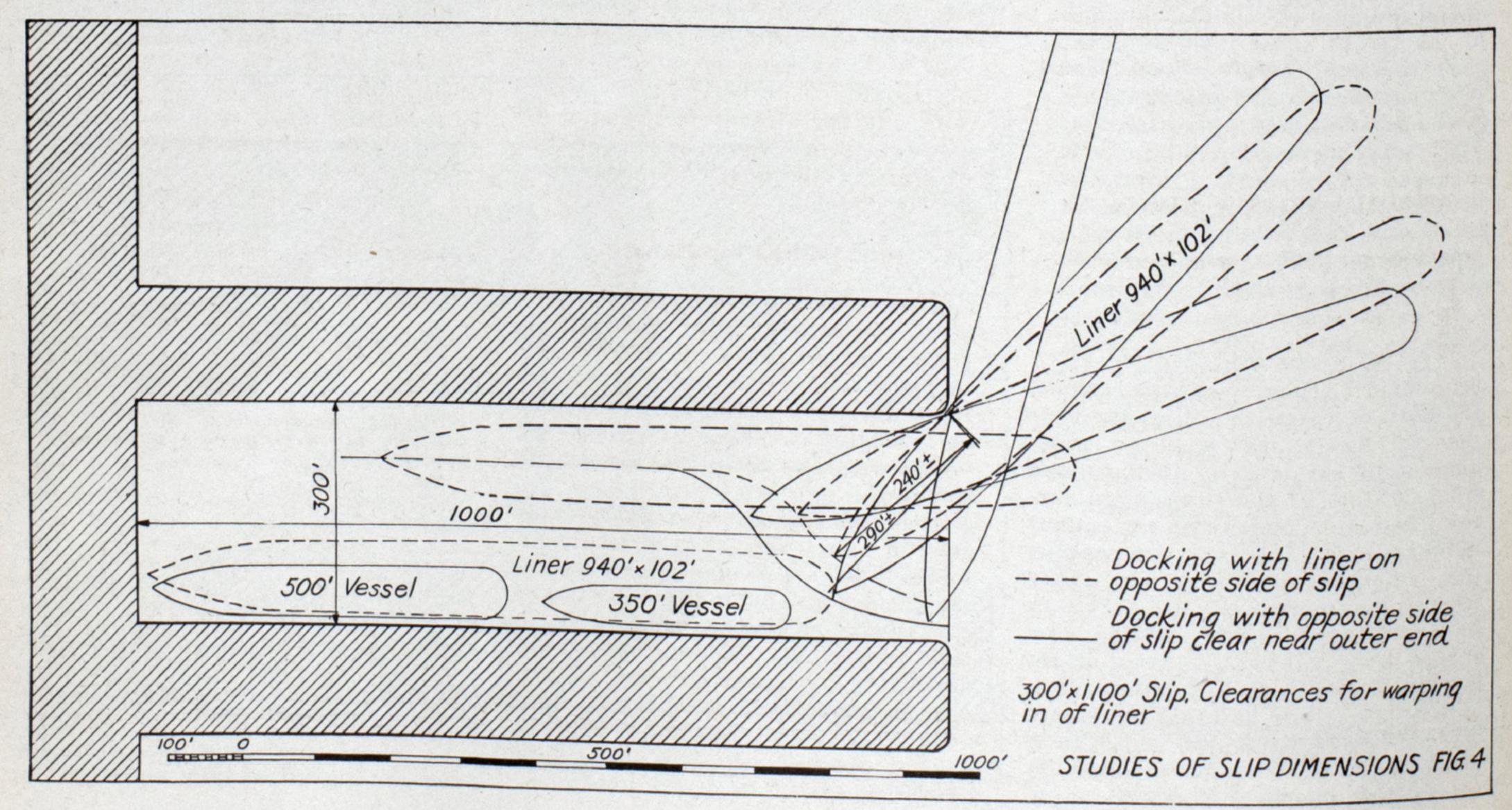
other words, copied from previous pier or wharf designs). Too often, terminals have been designed without thought being given to the fact that the principal terminal functions are the prompt dispatch of ships and the economical handling of cargo, and in some cases passengers.

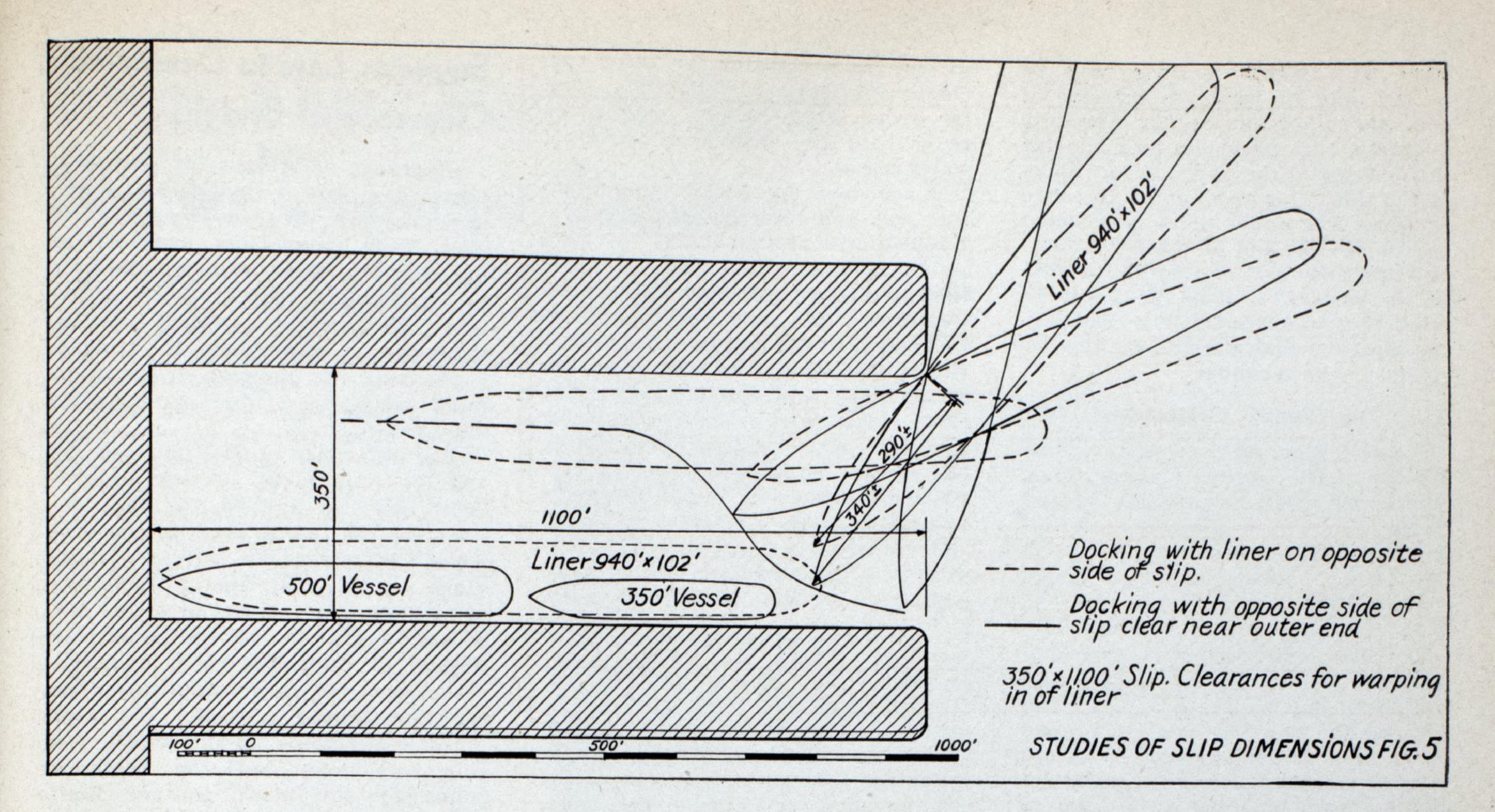
Water Areas and Slips

In determining the characteristics of the water areas of a terminal, careful consideration of the ships and other craft to use them is of obvious necessity. Although this seems an elementary feature of terminal design there are some points that seem worth while bringing out.

As in terminal design generally, definite rules cannnot be laid down for dimensions of slips or basins. These dimensions should be based on the length, breadth and draft of the vessels which it is anticipated will use the terminal. In making such estimates of anticipated use, many factors should be studied. The port and its location, the probable trend in the development of its commerce, its physical advantages or limitations, including tidal variation, the terminal location and purpose and its probable class of traffic, should all be carefully analized. Not all ports and by no means more than a small percentage of terminals will be required to take care of the maximum vessels; most ports are limited by geographical of physical conditions to smaller vessels of one class or another.

The accompanying Table I shows the approximate proportions of ocean vessels of the present time. It is difficult to estimate the future characteristics of vessels to anticipate the advancement in the art of shipbuilding. The tendency at present is to decrease draft and increase beam as





may be seen from the characteristics of the Europa, Bremen and the newer vessels being built.

Allowances in water areas must also be made for auxiliary craft such as lighters, fuel and grain barges, grain elevators, cranes, tugs and other craft, characteristics of which for the Port of New York are givin in Table II. So far as conditions will permit it should be possible for such craft to be spotted in the desired positions without delay to operations at ships (unless at the particular hatch port or bunker at which the spotting is

Table I DATA FOR STUDY OF SLIP DIMENSIONS, ETC. PORT OF NEW YORK DIMENSIONS OF LARGE OCEAN VESSELS

	Length	Beam	Draft (loaded)
Majestic	954	100	39
Leviathan	951	100	40
Berengaria	919	98	39
Bremen	939	102	34
Europa	939	102	35
Aquitania	902	97	37

APPROXIMATE PROPORTIONS OF OCEAN VESSELS

Length	Beam	Draft	Length	Beam	(loaded)
900	98	40	450	60	28
800	89	38	400	54	27
700	80	36	350	49	26
600	72	34	300	44	24
500	65	31	250	37	22

being made). Narrow slip ways affect the cost of cargo handling in ports such as New York, where a large amount of cargo is handled to and from lighters. If the slip way is narrow, two steamers—with attendant lighters—will block the slip way so that it is impossible to take a lighter from the inshore without moving a whole string of lighters alongside one of the ships. This is just as serious an interference with the operation going on at the various hatches, as results when there is one ship side track provided, or when with two ship side tracks, the necessary cross-overs for

these tracks are omitted.

Fig 1. illustrates the problem of proper slip widths. This is a study of a 300-foot wide slip with 1100 foot piers based upon an average 500foot cargo carrier, and indicates sufficient width for bringing in or taking out inshore vessels from inshore berths. The layout shows, however, that it would be difficult or impossible to bring such vessels in when the outboard berths were both occupied in which case it would be necessary to remove one or the other of the vessels, depending upon the stage of tide. For the same width and length of slip Fig. 2 shows a study of two large steamships of the size of the EUROPA and BREMEN. This indicates that while physically there is room in the slips for two such vessels with lighters off-side, it would be impractical to berth such a vessel with another already in the slip and also that there would be loss of time in shifting lighters. The congestion is self-evident.

Slip Widths for Handling

For the same length of slip and with a width of 340 feet Fig. 3 shows the condition for long vessels in place, which permits movement of lighters, but conditions are still difficult for the berthing of the second vessel with one large ship already in the slip.

It is not enough to study the vessels or small craft as actually in place—their movements and necessary clearances during the moving in or out should also be considered. In this connection consideration should be given to currents, delays which may be occasioned in docking, comparative expenses incurred for tug boats in docking, and any other ship operating factor in determination of

slip dimensions. Figures 4, 5 and 6 also are typical studies for the determination of slip dimensions desirable for the docking of large vessels.

Table II

Dimensions of auxiliary craft at the port of New York, useful in a study of ship dimensions for a terminal at this port.

LIGHTERS (TOWED)

*Number consid	dered-1267		
	Length	Beam	Draft
Average	. 93	30	8
Maximum	. 206	41	13
Minimum	. 50	17	2
SELF-PI	ROPELLED	LICHTI	PR

		Draft
115	28	10
258	40	19
47	16	4
	258 47	258 47 16

s-Seagoing barges OIL CARRYING BARGES

"Number conside	Length	Beam	Draft
Average	153	311/2	111/2
Maximum	258	40	11½ 20½
Minimum		23	9
T	HARROR '	TUCS	

*Number considered—644	
Length Beam	Draft
Average 85 21	10
Maximum 142h-155c 32	17h-18c
Minimum 36 11	4

h-Harbor c-Coastwise or seagoing

*Data from Port Series No. 10, Port of New York. War Department-Shipping Board.

These indicate the effect of slip length, or the clearance between the end of pier and ship already in the slip, as well as of slip width, on the warped into its berth. In the case of passenger liner service it is especially desirable that provision be made for the docking of the vessel at any stage of the tide. This also applies to cargo carriers. Any undue delay is reflected in loss of time and of charter money, or reduction in the value of the ship to its owners. It must be borne in mind that the ship itself is probably the most expensive single facility involved in the terminal.

Tug Service is Required

Another item of expense that may develop into serious proportions, mentioned above, is the use of tug boats involved in docking and undocking. The port captain of one of the largest steamship lines states that on their large vessels often 10 to 12 tugs are required, whereas with wider slips and more room, probably less than half this number would be sufficient; and he states that the tug charges for docking and undocking these large vessels amount to nearly \$80,000. a year. Saving of one third of this charge would readily justify a considerable additional first cost.

For larger vessels, it should be noted that allowance must be made for breasting floats between vessel and pier or quay, and for swinging floats at the corners about which vessels are warped.

It is elementary that safe clearance must be allowed for, between keel and the bottom. In this connection due allowance should be made for the character of bottom, and to insure that ships will not ground at extreme low tide. Besides the questions of accesibility of berths, horizontal and vertical clearances, etc., as briefly discussed, other factors—such as the necessity or availability of supporting anchorage space, the

safety from collision or other accident afforded ships at berths, shelter from storm waves, may often enter into the design of terminal water areas.

Space does not permit going into the pros and cons in the old piersversus-quays argument. As we have stated in connection with the question of the general layout of marine terminals—this is a question to be decided upon the merits of each individual case. Quays or wide piers are undoubtedly desirable because of the more ample land areas available for aprons, tracks, roadways and sheds, but special conditions—such as restricted waterfront, high property values, number of berths required and unusual operating or traffic conditions, after make the use of comparatively narrow piers imperative.

Short Piers Not Desirable

Short piers will rarely be found desirable: long piers will generally be more economical of space (including waterfront), more flexible as to availability to various lengths of vessels, and more economical in first cost. Long piers must, however, have sufficient width to keep outboard space accessible for land transportation and to avoid congestion. The design of a quay or pier must be adapted to the characteristics of the ships to use it. They must have the necessary stability and strength to resist forces due to docking and mooring, and the strength to carry the proper operating deck loads of cargoes, as well as other forces not directly concerned with operation. Their design must be adapted to the methods and facilities for loading and unloading ships. Overall loading requires reasonable landing space and clearance between ship and shed.

(To be Continued)

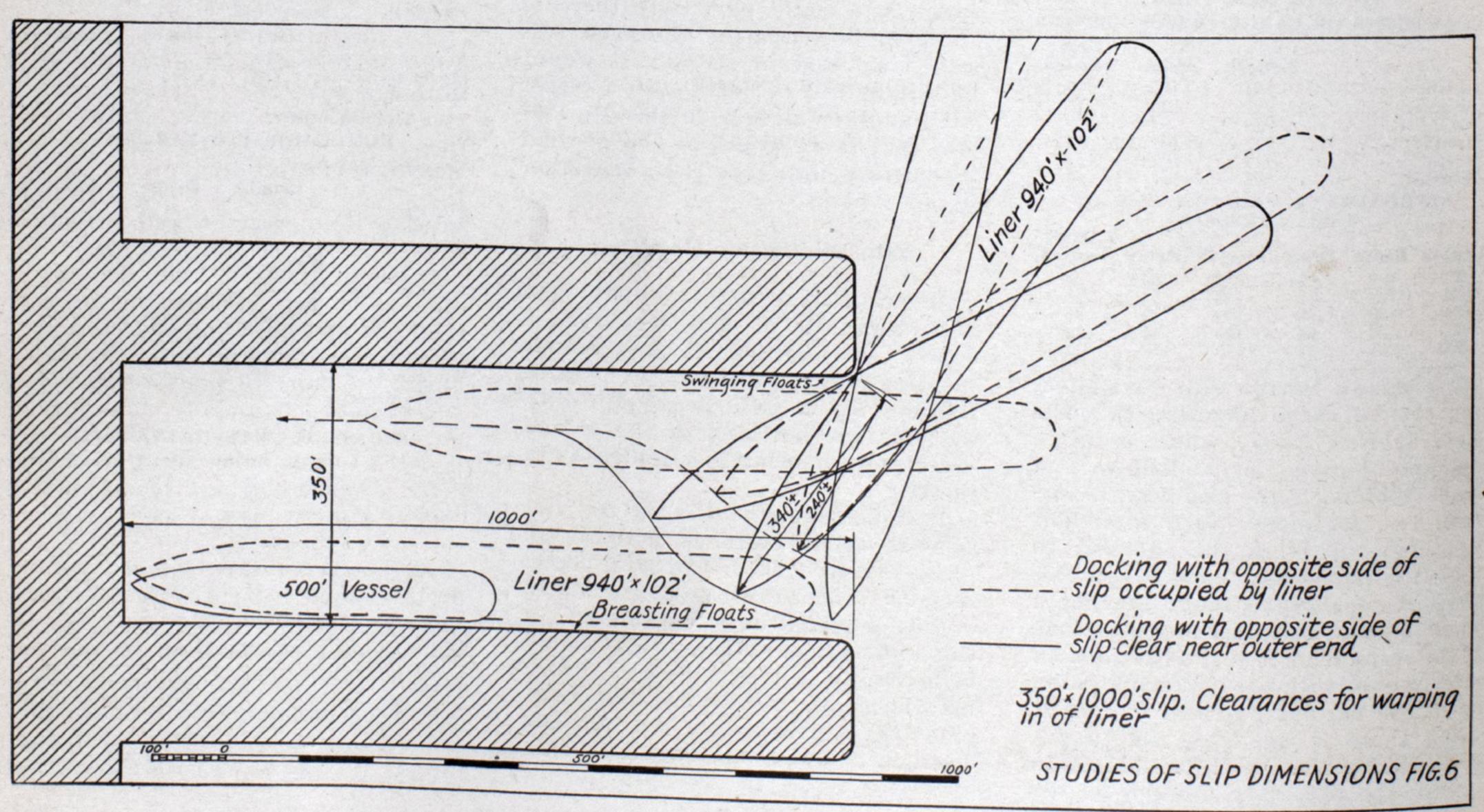
Suggests Law to Determine Clearance of Bridges

Clearance of bridges for vessels in first class ports should be determined by law, Francis Lee Stuart of New York, consulting engineer of the Hudson river project, declares in a statement issued by the American Engineering council which, through its committee on bridges, is studying the question of the minimum height of bridges over navigable waters.

The difference in cost between the 185 feet desired by the war department and the 150 to 160 feet desired for the public good in the proposed Fifty-seventh street bridge alone would be at least \$20,000,000 to \$25,000,000, according to Mr. Stuart, president of the American Society of Civil Engineers and representative of that organization in the Engineering council. He said:

"The clearance of the draft of a ship has been fixed by Ambrose channel in New York, and the clearance of the beam has been determinded by the Panama canal. What is now needed is vertical clearance so that the people of the country could plan to develop harbors and water ways without being uncertain as to the height that would be granted by any particular body in the engineer corps.

"From the opinion of many marine constructors, the questioning of practical navigators, it develops that there is no known economic reason why masts on a steamship should be higher than necessary to provide proper rigging for derricks, why ships' masts could not be telescoped so as to pass under bridges of 150 feet in height."



Swiss Rhine Port of Basle Shows Constant Progress

RECENT article in the Anglo-Swiss Commercial Gazette points out that on Nov. 17, 1930, the 1,000,000 ton figure of turnover was recorded at the Rhine Port of Basle and the event was the occasion of a special celebration in circles connected with river shipping.

Up to the end of November the turnover recorded increased to 1,-040,467 tons, the turnover for the month of November itself having been 94,120 tons. This favorable state of affairs is due to the excellent conditions which have obtained on the Rhine throughout the summer, the level of water on the open river having made it possible to make extensive use of the Rhine itself as opposed to the lateral Huningen canal from Strasbourg. Of the total turnover for the eleven months of 1930 given above, 583,179 tons were transported via the canal as against 457,288 tons via the open river. Of the turnover of 1,040,467 tons for

traffic plays a much more important part in Rhine traffic to Basle than that downstream. The accompany-



Basle, Switzerland, is Rapidly Developing Into a Leading Inland Harbor

Table Showing Fluctuations in Rhine Traffic

	Rhine	Canal	1930	1929	1928
	Tons	Tons	Tons	Tons	Tons
January	690	54,518	55,208	14,054	21,111
February	7	37,101	37,108		25,878
March	174	52,265	52,439	25,193	36,834
April	3,194	80,588	83,782	64,847	32,786
May	31,105	76,172	112,277	72,959	46,848
June	68,161	68,931	137,092	75,149	42,403
July	113,524	68,522	182,046	93,318	41,425
August	111,554	9,902	121,456	69,624	9,915
September	32,421	22,811	55,232	73,016	53,670
October	51,978	57,729	109,707	47,350	60,996
November	39,480	54,640	94,120	36,773	49,533
	457,288	583,179	1,040,467	572,283	421,399

the eleven months of 1930, the figure of 952,256 represented goods brought up river, which shows that upstream

ing table shows the fluctuations in Rhine traffic throughout the year 1930 with comparative figures for



St. Johannhafen, Showing Pneumatic Grain Unloader in Foreground

and the number of persons engaged in Swiss Rhine navigation is between 1000 and 1200.

two preceding years, 1929 and 1928.

ing companies established in the

Rhine harbors represent a capital of

22,000,000 Swiss francs. The build-

ings, wharfs and docks belonging to

these companies are insured for a

value upward of 10,000,000 Swiss

francs. The capital invested in the

various constructions and ships-

The Rhine steamship and unload-

The most important cargoes transported by waterway to Basle include coal, iron, bar, clay oil, benzine, grain and chemical raw materials. Cargoes of phosphates and wood also are on the ascendant. The waterfront has a wharf length of 2100 meters, 18 cranes, eight pneumatic grain unloaders and 14.5 kilometers of rail.

Traffic in the Rhine harbors in 1928 did not equal that of the preceding year, owing to the insufiicient water level prevalent at that time. This points clearly to the necessity of hastening the regulation of the Rhine, a work which, according to the opinion of men well versed in these matters, should be carried out independently from the side-canal plan to be accomplished on French territory and entailing the construction of several vast stowage works during the next 10 years. The Swiss government has already entered into an agreement with the German authorities to this effect and thus a first decisive move has been made toward solving the problem of navigation on the Rhine throughout the year.

As the advantages of navigation on the Rhine become more generally known, other Swiss districts (aside from Basle) are availing themselves of this transportation route. In 1924 nearly one-half of the merchandise was destined to Basle alone; in 1926 the proportion was reduced to 15 per cent and in 1927 to 8.3 per cent.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman

Attorney at Law

T WAS declared in the case of Christopher v. Grueby, 40 F (2d) 8, that a vessel owners' duty requires them to provide reasonably safe appliances and equipment that would render those appliances reasonably safe for the uses to which they were to be put in the place where installed and the condition there existing; that the owners cannot escape their duty to provide and equip a seaworthy vessel, or duty imposed upon them by statute, by requiring that payment for necessary equipment shall be made from proceeds from sale of fish before distribution among the crew; that the duty of the ship owners to see that their ship is seaworthy, etc., is a personal one, responsibility for which they cannot escape by delegating its performance to another; and that seamen injured through the owners' failure to see that their ship is seaworthy and the equipment safe are entitled to compensation.

ASTERS should not impose upon seamen any conditions as to payment of wages, said the court in the case of Lake Gaither, 40 F. (2d) 31, and especially should they not impose as a condition to payment a waiver of any legal right the seamen may have. If the seaman's claim be unfounded and preposterous the master takes no chance in payment without condition, and to require what would be in effect a waiver of the right to bring such action as the seaman may be advised to bring, is in controvention not only of the plain provisions of statute, but is a violation of the clear intention of congress in its passage.

OTICE of apparent damage required by steamship bill of lading before goods are removed from the vessel is not equivalent to a claim for damage.—A. Russo & Co. v. United States, 40 F. (2d) 39.

A TOWING boat is only required to exercise reasonable care, caution, and maritime skill under similar circumstances, and, if such care, caution, and skill are exercised by those charged with her management, no liability attaches to the tug for injury to or caused by the barge in tow.—Ellenville, 41 F. (2d) 47.

HEN a carrier by water or by land deliberately, and without any semblance of right, converts goods intrusted to its care, it will not be permitted to take advantage of its tort by an insistence upon compliance by

the wronged party of such portions of the contract of carriage as would normally be binding upon him, declared the court in the case of Bank of California v. International Mercantile Marine Co., 40 F. (2d) 78. The court further held that where goods shipped from the United States were wrongfully delivered in Germany, the cause of action arose at the time of the breach, and the damages should be translated into dollars at the rate of exchange then prevailing. In a second case between the same parties (40 F. (2d) 80), the court said that a carrier's misdelivery of freight to a person, who is not entitled to receive the same, subjects it to liability to any one who has a right of property in the goods, or who is entitled to the possession thereof. And, if the goods have moved under an order bill of lading, the carrier's liability extends to any one who, for value, and in good faith, purchases such bill, and irrespective of whether the bill was acquired before or after the wrongful delivery of the goods by the carrier. A carrier has no right under any circumstances to deliver to a stranger.

WHERE a charter bound the charterer to load unconditionally within a prescribed time at a certain rate, an intervening stevedores' strike, making it impossible to load, is a risk which was assumed by the charterer. It is immaterial that the shipowner was also prevented from doing his part of the work within the required time unless he was at fault; the charterer takes the risk, and the delay cannot be set as a defense to a claim for demurrage. — United States v. Czarnikow-Rionda Co., 40 F. (2d) 214.

THE oral charter of a scow being treated as a demise, the charterer is not an insurer, but is subject to the law of bailments for hire, said the court in the case of Tomkins Cove Stove Co. v. Bleakley Transportation Co., 40 F. (2d) 249; and as a bailee, he is charged with the duty of ordinary care and is liable for negligence resulting from a breach of that duty and for nothing more. The burden of proving negligence is upon the owner.

APPARENTLY the term "average accidents" has not been used extensively in charters, and seems to have found its way into the books but rarely said the court in the case of Barker v. Moore & McCormack Co., 40 F. (2d) 410. "It certainly has acquired no meaning in maritime law other than it has elsewhere except

in so far as the word 'average' may be said to color the expression and confine it to accidents which do not result in total loss. The term 'free from average' in marine insurance is well known to mean that the policy covers total loss only. If this word is given the same significance here, it is akin to partial, and the expression will mean an accident not resulting in the entire loss of the ship and cargo. * * Whatever else may be thought, it surely is true that an accident of some kind is necessary to call into play the off hire clause on account of 'average accidents.'"

CHARTERS of barges without motive power, accompanied by bargee paid by the owner, are demises. Legally such vessels are regarded as in the exclusive possession of the charterer. In such relation the charterer is only liable for negligence.—Ira S. Bushey & Sons v. W. E. Hedger & Co., 40 F. (2d) 417.

THE peril which forms a good exception in a bill of lading means something so catastrophic as to triumph over those safeguards by which skillful and vigilant seamen usually bring ship and cargo to port in safety. Damage to a cargo caused by a wave of such damaging proportions that not only was one ventilator coaming broken, but another ventilator was pushed up and off its coaming, arose from a "peril of the sea."—Duche c. Thomas and John Brocklebank, 40 F. (2d) 418.

WHILE a ferry was right in leaving her slip, in spite of a fog, according to the case of Youngstown, 40 F. (2d) 420, she was of course bound to use caution, once under way, and the fog rules applied as much to her as to any other vessel.

HE test of seaworthiness is whether the vessel is reasonably fit to carry the cargo which she has undertaken to transport. In determining whether or not the exemptions of the Harter act are in force, the point of time at which the test of seaworthiness is to be applied is the commencement of the voyage. Within this rule, the fact that a vessel which had taken on all her cargo and was ready, so far as stowage of the cargo and equipment or for the voyage were concerned, to sail, thereafter dropped anchor in another port to discharge, stevedores did not have the effect of making a new stage of the voyage begin at that point.—Oritani, 40 F. (2d) 522.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York	Baltimore	New Orleans
(Exclusive of Domestic) —Entrances——Clearances—	(Exclusive of Domestic)	(Exclusive of Domestic)
No. Net No. Net	—Entrances——Clearances— No. Net No. Net	-EntrancesClearances- No. Net No. Net
January, 1931 486 2,417,338 542 2,533,711	Month ships tonnage ships tonnage January, 1931 121 386,924 127 412,306	Month ships tonnage ships tonnage January, 1931 207 610,472 190 548,267
December	December 120 390,126 127 429,048	December 203 602,527 197 578,723
October	October 139 452,905 127 402,155	November
August 554 2,716,668 586 2,855,323 July 578 2,717,787 616 2,815,336	September	September
June 585 2,722,344 559 2,596,692	July	July
May	May	May
Philadelphia	Norfolk and Newport News	Charleston
(Including Chester, Wilmington and the whole Philadelphia port district)	(Exclusive of Domestic) —Entrances——Clearances—	(Exclusive of Domestic) —Entrances——Clearances—
(Exclusive of Domestic) —Entrances——Clearances—	Month No. Net No. Net ships tonnage	No. Net. No. Net
Month No. Net No. Net ships tonnage	January, 1931 21 57,883 61 170,594	Month ships tonnage ships tonnage January, 1931
January, 1931 70 227,146 49 158,570	December	November
December	October	October
October	August	August
August 92 244,206 55 144,201 July 96 246,866 68 151,861	June	June
June	April, 1930 14 35,914 61 178,792	May
April, 1930 89 236,257 63 177,289	Jacksonville	Galveston
Boston	(Exclusive of Domestic) —Entrances——Clearances—	(Exclusive of Domestic) —Entrances——Clearances—
(Exclusive of Domestic) —Entrances——Clearances—	Month No. Net No. Net ships tonnage	No. Net No. Net
No. Net No. Net Month ships tonnage ships tonnage	January, 1931 14 28,243 10 15,617	Month ships tonnage ships tonnage January, 1931 25 45,442 84 260,555
January, 1931 76 245,382 49 195,091	December 17 33,862 16 29,847 November 14 30,105 10 13,048	December
November 77 248,220 61 232,826	October	October
October	August 15 29,565 12 20,856 July 6 14,312 8 20,739	August
July 152 325,325 110 222,555 June 152 325,325 110 222,555	June	June 28 60,622 63 171,223
May	April, 1930 13 23,378 13 27,999	May
Portland, Me.	Key West	Los Angeles
Portland, Me. (Exclusive of Domestic)	Key West (Exclusive of Domestic) —Entrances——Clearances—	(Exclusive of Domestic)
Portland, Me. (Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net
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Portland, Me. (Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage January, 1931	(Exclusive of Domestic) —Entrances— —Clearances— No. Net No. Net Month ships tonnage ships tonnage January, 1931	(Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage January, 1931 191 673,620 193 753,720 December 227 654,598 184 596,347 November 219 618,855 206 616,266 October 236 680,430 217 628,733
Portland, Me. (Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage January, 1931 December 23 55,605 23 60,126 November 21 46,182 20 40,916 October 17 41,667 20 45,989 September 32 53,423 28 49,428 August 36 69,765 36 72,282	CExclusive of Domestic -Entrances Clearances No. Net No. Net No. Net	CExclusive of Domestic -EntrancesClearances - No. Net No. Net No. Net Month ships tonnage ships tonnage January 1931 191 673,620 193 753,720 December 227 654,598 184 596,347 November 219 618,855 206 616,266 October 236 680,430 217 628,733 September 255 697,262 218 616,018 August 211 631,167 221 621,088
Portland, Me. (Exclusive of Domestic) —Entrances——Clearances— No. Net No. Net Month ships tonnage ships tonnage January, 1931	CExclusive of Domestic -Entrances Clearances No. Net No. Net No.	Carclusive of Domestic -Entrances - Clearances - No. Net No. Net No. Net Month ships tonnage ships tonnage January, 1931 191 673,620 193 753,720 December 227 654,598 184 596,347 November 219 618,855 206 616,266 October 236 680,430 217 628,733 September 255 697,262 218 616,018 August 211 631,167 221 621,088 July 230 687,670 196 611,768 June 240 632,188 225 641,270
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Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 66 of 216,784 net tons entered and 61 of 202,337 net tons cleared for the month of January.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

HE signing by President Hooof the Free-Vandenburg bill, which establishes the interest rates on ship loans granted by the United States shipping board under provisions of the Jones-White act, will encourage ship construction and protect coastwise and intercoastal ship operators according to opinions of leading shipping authorities. This new bill fixes the rates of interest on loans granted for construction of ships for the foreign trade at 3 1/2 per cent while for loans for vessels to be built for the coastwise trades, the rate becomes 5 1/4 per cent.

Under provisions of the Jones-White act, the rate of interest which the builders of ships for foreign trade had to pay was based on the amount of interest paid by the government in the open market. Frequent fluctuation in the government interest rate resulted in the obtaining by some ship owners of extremely low rates. The law controlling construction loans is amended by the new bill to read as follows:

"All such loans shall bear interest at such rates as follows, payable not less frequently than annually: During any period in which the vessel is operated exclusively in the coastwise trade, or is inactive, the rate of interest shall be as fixed by the shipping board but not less than 5 1/4 per cent per annum. During the period in which a vessel is being construced, equipped, reconditioned, remodeled or improved; and/or during any period in which such a vessel is operated in foreign trade, the rate shall be as fixed by the board but provided, however, that on all contracts hereinafter entered into the interest rate shall be not less than 31/2 per cent per annum.

"The lowest rate of interest shall not be granted for the construction, equipment, reconditioning, remodeling or improvement of any vessel for the foreign trade unless it is contracted that such vessel upon completion shall not be operated exclusively or under enrollment in the coastwise or intercoastal trade for more than three months in any calendar year and if such vessel shall be operated exclusively and under enrollment in such trades for more than three months in any calendar year the board shall collect the difference between the low rate of interest charged and 51/4 per cent per annum during the period of construction, equipment, reconditioning, remodeling or improvement. The board

may prescribe rules for determining the amount of interest payable under the provisions of this paragraph."

Cruiser Contract Awarded Camden Shipyard

Contract for constructing the hull and machinery for light cruiser No. 37 was awarded Feb. 14 by the navy department to the New York Shipbuilding Co. of Camden, N. J., on a bid of \$10,450,000. This vessel is to be the last of the 10,000 ton 8-inch gun cruisers to be laid down before 1933. The bid of the New York Shipbuilding Co. was the lowest of three made. The construction is to be completed within 36 months.

The cruiser will be 600-feet long overall with an extreme beam of 64 feet 11½ inches and a mean draft of 17 feet 7 inches. The vessel will be equipped with turbine propelling equipment totaling 107,000 horse-power. She will carry nine 8-inch guns in three turrets and four 5-inch antiaircraft guns. She will be equipped with two torpedo tubes and will carry four observation planes. Her personnel will consist of 49 officers and 553 enlisted men.

Plan Auto-Passenger Ferry

Joseph M. Dyer, naval architect, Astoria, Oreg., is completing plans for a wood automobile and passenger ferry for the Astoria & North Beach Ferry Co. Dimensions are: Length, 120 feet overall; moulded beam, 36 feet; draft 7 feet. The hull will be V bottom with a semi-tunnel stern rendered necessary by the draft requirements. Power to be installed has not been selected but 500 horsepower engines, calculated to develop a speed of 14 to 15 miles, are planned. Capacity will be 35 automobiles and will include accommodations for a large number of passengers in well appointed cabins and saloon.

Navy Yard to Repair Cutter

According to an announcement made by F. A. Hunnewell, superintendent of construction and repair, United States coast guard, decision has been made, after careful consideration of all the factors involved, to perform the work of repair and alteration of the coast guard cutter UNALGA, at the United States navy yard,

Philadelphia. The bid, totaling \$63,-047 of which \$35,170 was for hull and \$27,877 for machinery, was the lowest of ten offered. The highest bid was presented by the New York navy yard and amounted to \$99,946 of which \$67,646 was for hull and \$32, 300 for machinery. Other bids were as follows: Norfolk navy yard, \$68,-500; Maryland Dry Dock Co., \$71,-179; Todd Dry Dock Engineering & Repair Corp., \$77,500; Norfolk Shipbuilding & Dry Dock Corp., \$82,136; Brewer Dry Dock Corp., \$84,950; United Dry Docks, Inc., \$86,660; Ira S. Bushey & Sons, Inc., \$91,821; and Old Dominion Marine Railway Corp., \$98,500.

Ford to Dieselize Ship

Permission was given the Ford Motor Co. by the shipping board Feb. 18, to convert the lake type vessel, LAKE SHAWANO to a motorship. The vessel was one of 199 similar type ships purchased from the shipping board in 1925 with the understanding that they be scrapped or, in the case of ten of the ships, upon payment of an additional sum that they be converted into barges. In the case of the LAKE SHAWANO, the board has agreed to permit the Ford company to convert the vessel to a diesel ship upon payment of this additional purchase price. The vessel is a steel cargo steamer of approximately 3300 deadweight tons.

Liner Nears Completion

The President Hoover, new electric Dollar liner now nearing completion at Newport News, Va., is scheduled for her trial trip on or about June 15. On July 27 she will leave New York on her maiden trip to China and return via the Panama canal. She will not only be the first large passenger vessel on that run to go to China from New York and return, but will also be the first American-built, electrically propelled ship to cross the Pacific. Her propulsion equipment—supplied by the General Electric Co. will give her a maximum speed of 21 knots.

The Newport News Shipbuilding & Dry Dock Co. at Newport News is now finishing the holds of the vessel, completing the decking and foundations, and installing the auxiliary machinery and cables. In about two months, work will be started on the joinery and interior decorating.

First Turbine Geared Tug Underway at Manitowoc

About the middle of February the Manitowoc Shipbuilding Corp., Manitowoc, Wis., was employing around 550 men in the shipyard.

The most recently completed job was the steel carferry CITY OF MIL-WAUKEE for the Grand Trunk railroad. The general features of this vessel were given in the January issue of MARINE REVIEW. She is the third carferry designed and built at this yard for the same owner within the past four years. With the other three boats of the company she is now operating on regular runs from Milwaukee across Lake Michigan and back.

A contract was recently received from the Great Lakes Dredge & Dock Co. for a large steam turbine driven tug. This tug will be unusually up to date in every respect. The dimensions are, 115 feet in length, 26 feet in beam, and 15 feet in depth. The power will be a Westinghouse geared turbine, the first of its kind on the Great Lakes and said to be the first geared turbine drive for a tugboat anywhere in the world. This unit will give 1000 shaft horsepower and 100 per cent astern power. The gears are to be enclosed in a welded steel case. Steam at 325 pounds per square inch, 200 degrees Fahr. will be generated in a Babcock & Wilcox watertube boiler supplied with that company's burners and superheaters. Other Westinghouse machinery equipment for this tug will consist of a welded steel condenser, exhaust trunk, oil cooler and feed water heater, also the blower and circulating pump, which will both be of the propeller type.

In addition there is under construction one 500 yard dump scow for Edward E. Gillen Co., Milwaukee; one scow for the United States Engineers office, Chicago; and two channel deck scows, 130 feet long by 39 feet 9 inches in beam by 9 feet 9 inches in depth, for the Great Lakes Dredge & Dock Co., Chicago.

Maiden Voyage of Liner Set Three Weeks Ahead

The new 42,500-ton liner EMPRESS OF BRITAIN will sail from Southampton May 29 on her maiden voyage to Quebec, according to an announcement made Feb. 7 by the Canadian Pacific Steamship line. This date is three weeks earlier than was originally planned and is made possible by a speeding-up in the work of completing the liner. Under the new schedule the Empress of Britain when she arrives in Quebec will make the westbound crossing in less than five day's time. Making a quick turnabout she will leave Quebec for her first eastbound voyage on June 6.

With a carrying capacity of only 1153 passengers, the Empress of Bri-TAIN was built specially for de luxe travel, and will be the largest ship yet built to carry such a limited number of passengers, the whole idea being to provide spacious apartments, public rooms and promenade area for the convenience of the ship's patrons. The liner's public rooms have been designed by some of England's most famous artists.

Discuss Proposal for New Lake Coast Guard Cutter

Plans for the construction of a new coast guard cutter which is to be stationed on Lake Michigan were discussed in Cleveland Jan. 30 by representatives of the coast guard, Lake Carriers Association, and Great Lakes shipbuilding companies. A sum of \$650,000 has been appropriated by congress for the construction of this craft and tentative plans have been made. These plans were submitted to shipping men on the lakes in order to get their opinion of the proper type.

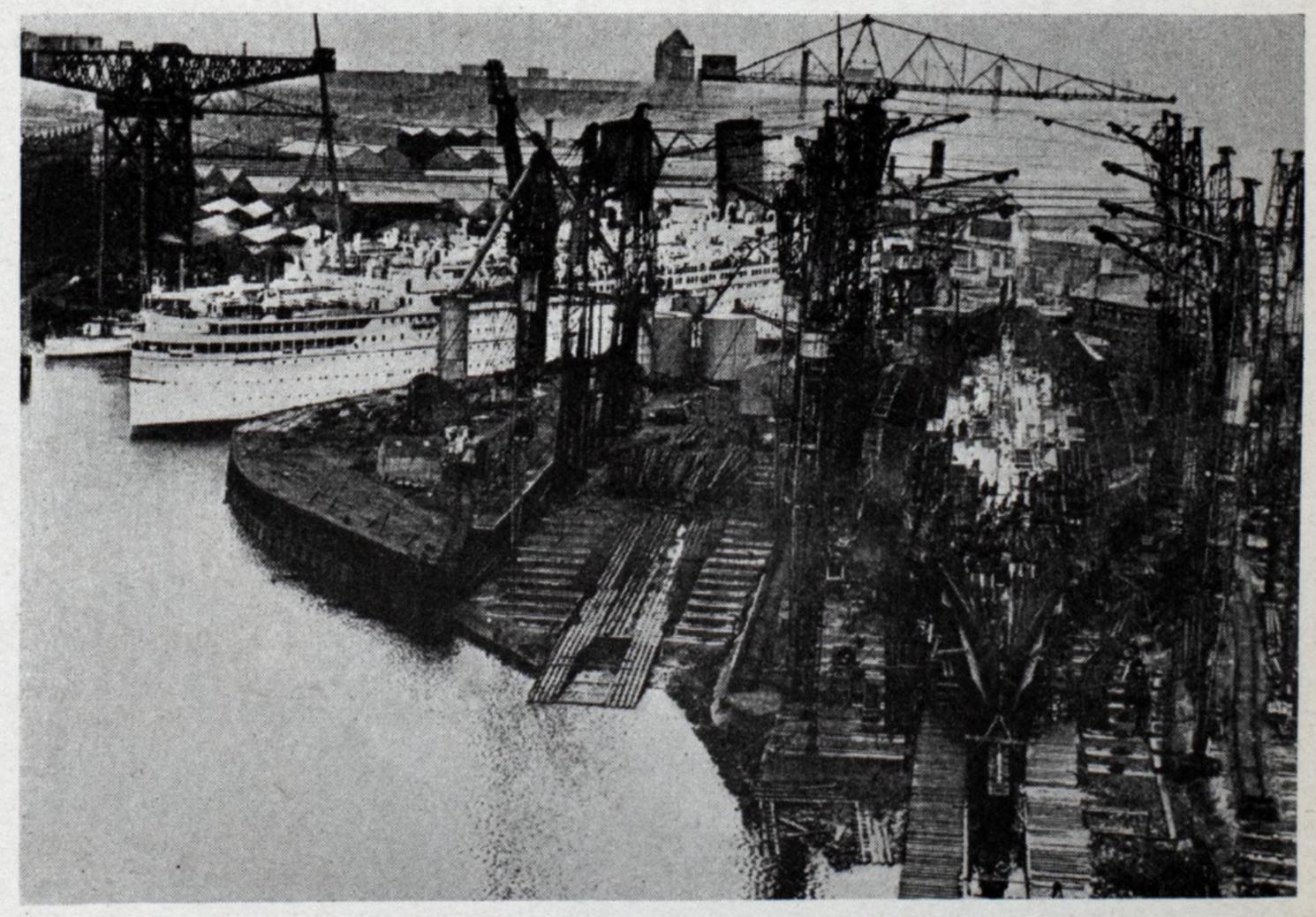
The general opinion was that the cutter should be from 150 to 170 feet long, from 34 to 36 feet beam, with a maximum draft of 14 feet, and have a speed of 15½ miles per hour.

The division of the coast guard was represented by Capt. J. J. Walton, senior machinery constructor; Commander F. A. Hunnewell, in charge of construction; H. F. Johnson, machinery constructor; and E. M. Kent, junior constructor. The Lake Carriers association was represented by L. C. Sabin and George A. Marr. N. H. Herriman represented the American Bureau of Shipping.

Contract Awarded for Two New Ford Cargo Ships

Contract for the construction of two 300-foot cargo ships has been awarded by the Ford Motor Co. to the Great Lakes Engineering Works, River Rouge, Mich. These vessels, which will be the largest of their type ever built for operation between the Great Lakes and salt water, will be the first of their type to be powered with turbine propelling equipment. They were designed by Henry Gielow Inc., naval architects of New York City, and will be delivered June 1 and June 15, respectively.

Each vessel will be powered with a pair of 800-horsepower geared turbines deriving steam from oil burning boilers at 400-pounds per square inch working pressure. The turbines, turning at the rate of 7200 revolutions minute, will deliver power through reduction gearing to twin screws at 250 revolutions per minute. The vessels will have a speed of 14 miles per hour and will have cargo space for 2000 tons of boxed freight. Each vessel will have a beam of 43 feet, a molded depth of 20 feet and a draft of 10 feet. No wood is to be used in the construction and all the deck superstructure will be collapsible so that the masts and stack may be dropped to the deck and the pilot house dropped into a well to afford adequate clearance when passing under bridges. These ships will have one deck running full-length. The propulsion and operating machinery will be located in the after end; quarters for a crew of 17 will be located immediately forward. Both vessels will be operated entirely by telemotor from the pilot house in the bow. Steering will be by electrically controlled double rudders. Cargo will be handled through nine hatches.



An Air View of the World's Largest Ship, Building in the Yard of John Brown & Co. Ltd., Clydebank, Scotland, for the Cunard Line. The Giant Liner will Be 1018 Feet Long With a Displacement of 73,000 Tons. In Background, Empress of Britain

An Electric Welded Diesel Oil Delivery Vessel

The miniature oil tanker Gene and Don belonging to the Fish Pier Supply Co. (owner Mr. Eugene Fitzpatrick) may be seen along Boston's waterfront any time busily engaged in delivering diesel oil and machinery supplies to trawlers, fishing schooners, and other vessels.

This interesting little vessel which has the distinction of being the first and only one of welded construction in Boston harbor, was designed and built by the Bethlehem Shipbuilding Corp. Ltd., Boston plant at the Atlantic Works, East Boston, Mass.

The Gene and Don is designed to carry 13,000 gallons of diesel oil in two deep tanks and 1000 gallons of lubricating oil in two 500-gallon cylindrical tanks and also carries grease, special oils, packing, spare parts, waste, etc. in the forepeak. She is 55 feet long, 15 feet 6 inches beam and 6 feet 6 inches deep.

The general arrangement shows a flush deck vessel with three oil-tight bulkheads dividing the hold into fore-peak, forward deep tank of 5000-gallon capacity, after deep tank of 8000-gallon capacity, and the engine room, in the after part of which are located the lubricating oil storage tanks. The deep tanks are fitted with a centerline bulkhead.

The propelling machinery consists of one 45 horsepower four-cylinder, four-cycle Fairbanks-Morse full diesel engine turning a three-bladed cast steel propeller at 650 revolutions per minute with a fuel consumption of slightly less than two gallons per hour,

Eastern Orders Two Ships

It was reported on Feb. 26 that the two new vessels, contemplated for some time for the Eastern Steamship Co. have now been contracted for with the Newport News Shipbuilding & Dry Dock Co. at an approximate total cost of \$7,000,000. One of these is for the run from New York to Yarmouth, N. S., and the other is for the service between Boston and St. John, N. B. Capt. Eugene E. O'Donnell, president of the Eastern Steamship Lines Inc., indicates his optimism that busines is now finally on the uptrend in going through with this order at this time.

The two vessels were designed by

Theodore E. Ferris and are to be 402 feet 9 inches in length; 61 feet in beam; 29 feet 9 inches in depth; and of 10,000 tons displacement. Accommodations are to be provided for 756 passengers and 178 in the crew for each vessel. The hulls will be divided by nine transverse watertight bulkheads. The engine room and fire room spaces will be protected by an inner shell.

Moore Dry Dock Co. was awarded contract Feb. 3 for a tender for the lighthouse service, San Francisco on a bid of \$139,949 for the hull. Machinery bids were rejected.

Will Launch Five Private Yachts in Near Future

Five private yachts, the largest of which is 279 feet, will be launched this spring and summer from the ship-yard of the Bath Iron Works, Bath, Me

The CAROLINE building for Eldridge R. Johnson of Camden, N. J., will be one of the most complete and one of the largest private diesel vessels ever built in this country. She is outranked only by the ALDER, owned by Mrs. William Boyce Thompson of Yonkers. The CAROLINE, designed by Henry J. Gielow, Inc., New York, will carry a pair of 1500-horsepower Cooper-Bessemer diesel engines in addition to 525 auxiliary horsepower. She will be equipped with a gyroscope weighing 100,000 pounds and her accommodations will include eight staterooms on the cabin deck and an owner's stateroom on the main deck.

Another yacht to be launched this spring is the 148-foot diesel electric boat building for a prominent New York yachtsman whose name has been withheld by the designers. The yacht is unique in that she will be the first diesel-electric pleasure boat ever built. Her propulsion units will consist of a pair of 400-horsepower Cooper-Bessemer engines connected to two generators furnishing current for the driving motors.

In addition, the Bath company is building the yacht Helene, 149 feet long, for Charles E. Sorensen, chief engineer of the Ford Motor Co.; the Seapine, 156 feet long, for Mrs. Frank H. Goodyear of Buffalo and the Halonia, 148 feet long, for Charles H. Thorne of Chicago and Pasadena.



Trial Trip of Oil Barge Gene & Don on Sept. 5, 1930

Reconditioned Cabin Liner Completes First Trip

The twin screw passenger liner General Von Steuben of the North German Lloyd, formerly the Muenchen, arrived at New York on Feb. 15 on her first trip from Bremen. She was reconditioned at the Weser yards of the Deschimag and her gross registered tonnage increased from 13,483 to 14,800. She is 527 feet long and 65 feet wide. Her passenger accommodations provide for 214 in the cabin class, 358 in the tourist third cabin and 221 in third class and her officers and crew number 285 persons.

The General Von Steuben is an oil burning steamer, and is propelled by two reciprocating engines of 31½ x 51¼ x 59 x 59 by 55 inches stroke, each working in conjunction with a Bauer-Wach exhaust steam turbine and developing a combined total output of 10,500 indicated horsepower at 86 propeller revolutions per minute. The total output obtainable with the reciprocating engines alone is 8500 indicated horsepower, thus 2000 equivalent indicated horsepower are gained without any additional expense for fuel.

The performance of this vessel will be of interest to shipping circles as the General Von Steuben is the most important of the 19 Lloyd liners that are equipped with combined reciprocating and exhaust steam turbine drive.

Award Tank Contract

Port of Seattle has awarded to the Commercial Boiler Works, Seattle, contract for constructing three steel tanks, 2000 barrels capacity each, for the storage of cocoanut and wood oils to be built at the port terminals at Smith Cove, Seattle. Increased tankage is necessary as some of the present tank capacity is to be utilized for additional fire protection.

New Light List Issued

A new list of lighthouses, light-ships, fog signals and other aids to navigation upon the Atlantic and Gulf coasts, has just been published by the lighthouse service of the department of commerce. A feature of the 1931 light list is a list of all airways beacons on the Florida coast which are visible from seaward. These lights are described and their geographical position is also given so that mariners will not confuse them with the marine navigation lights.

The new light list is on sale at the office of the superintendent of documents, Washington, and at numerous agencies for charts and light-house publications in all important ports of the country.

Launch World's Largest Yacht at Hamburg

The world's largest yacht building for Mrs. R. M. Cadwalader of Philadelphia was launched recently at the yard of Blohm & Voss in Hamburg, Germany. This vessel, the reputed cost of which is \$5,000,000, has a gross tonnage of approximately 5000 tons. She will be 407 feet 10 inches long overall and will resemble a small ocean liner. She will be driven by turbine propelling equipment with a total of 7200 horsepower and will have a speed of over 16 knots. She will require a crew of over 100 men. This huge yacht was designed by Gibbs & Cox of New York City and will have accommodations for about 40 guests. She will be fitted with practically every known type of apparatus for aiding navigation and increasing safety. It is understood that a gyro-stabilizer is to be installed.

Board Authorizes Loans for Additional Equipment

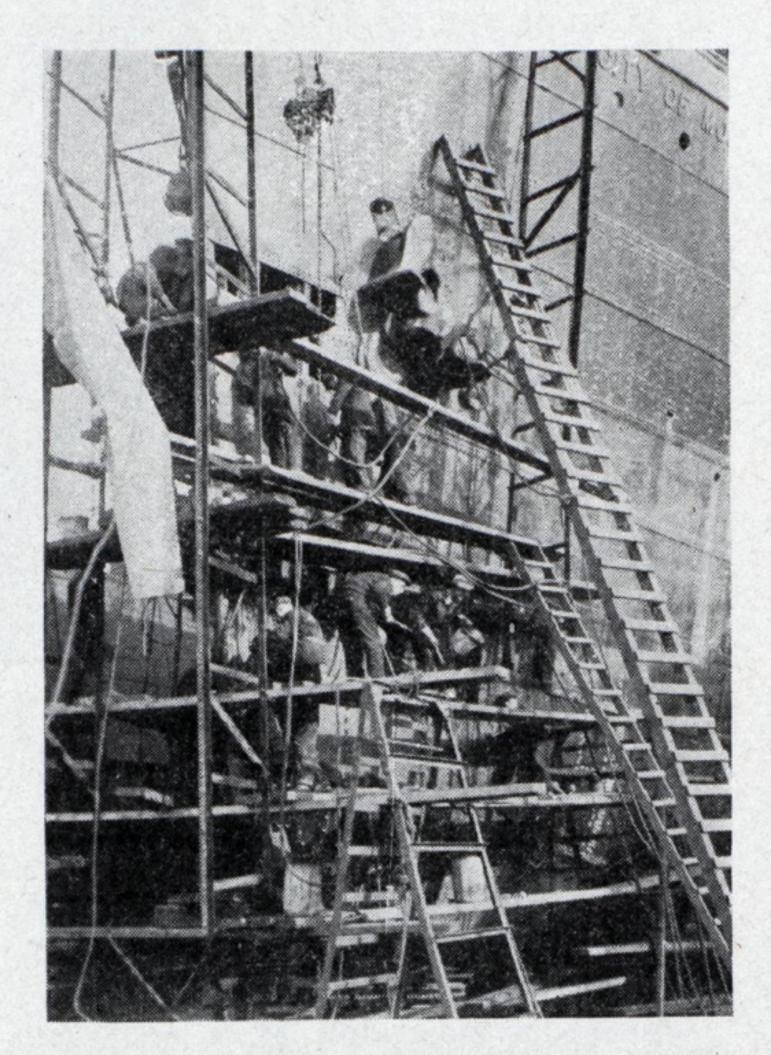
Loans of \$400,000 and \$169,340 were granted the Dollar Steamship lines and the Agwi Navigation Co., respectively, by the shipping board Feb. 18 for use in the installation of hotel equipment on vessels now under construction for these companies at the Newport News Shipbuilding and Drydock Co., Newport News, Va. The loans are supplemental to loans previously granted in aid of building these vessels and, added to the previous loans, represent three fourths the total cost of the ships.

Repair Jobs Completed in Record Time

Two major repair jobs were recently completed in record time at the Fletcher plant of United Dry Docks Inc., one on the steamer Santa Marta of the United Fruit Co. and the other on the steamer City of Montgomery of the Ocean Steamship Co.'s fleet.

The repair of the Santa Marta, involving a thorough overhauling was

completed in 26 days, as directed by the owners. Specifications called for the complete renewal of the steel upper deck, boat deck and smokestack. This included removal and rebuilding of all first class and officers' accommodations and the galley and steerage passengers' accommodations. In addition a number of shell and bottom plates were renewed. More than 200 tons of steel were used in the over-



The City of Montgomery in Dry Dock

hauling. The job was begun on Nov. 24 and delivered on Dec. 20, on time, despite the fact that the owners decided to complete a special survey during the reconditioning period which increased the amount of repairs by 30 per cent, with no extra time allowance.

The CITY OF MONTGOMERY collided with and sank the government dredge RARITAN in New York harbor and suffered considerable damage. Repairs included the renewal of 35 feet of the stem, ten bow shell plates and the necessary frames, breast hooks and other internal steel. Contract for this job was awarded to United at 1 p.m., on Jan. 6 and the ship was returned to her owners at 9 a.m. on Jan. 10, repairs being completed in the record time of three days and 20 hours.

New Propellers Installed on the Bergensfjord

The steamer Bergensfjord of the Norwegian-American line recently completed a record breaking run from New York to Bergen, Norway, making the trip in eight days, one hour and 53 minutes, which is three hours better than any previous run. Prior to this journey, the steamer was laid up at the Robins plant of the Todd Shipyards Corp., in Brooklyn, where she underwent alterations and repairs.

New solid bronze propellers were installed in place of the built up type, the advantage being that the hubs on the solid ones are much smaller and, therefore, offer less drag or resistence to fair water. This increased the speed of the Bergensfjord from 16 to 17¼ knots, a speed which the ship had not reached since she was constructed. Other work done by the Robins plant included the widening of the bilge keels for better stability and a thorough overhauling of the engine room.

Reports from Canada advise that Collingwood Shipbuilding Co. has been awarded the contract, valued at \$600,000 for the construction of a vessel for hydrographic survey work by the Dominion government. This contract will give employment to a large force of men.

Bids for Derrick Boat

Sealed bids have been received by the war department for furnishing all labor and materials and constructing and delivering a 25-ton steel derrick boat afloat at Kewaunee Harbor, Wis., complete with machinery and fittings.

The third liner being built for the Matson Line in its \$25,000,000 building program at the Fore river plant of the Bethlehem Shipbuilding Corp. will be named LURLINE. This vessel is to be launched in the early part of 1933. These three vessels will be 632 feet long, 79 feet beam, 22,000 gross tons each, and will cost about \$8,000,000 each.

				Bunker Prices			
	At Ne	w York		At Phil	adelphia		Other Ports
Feb. 18, 1931.4 Jan. 18	.85@ 5.25 .85@ 5.25 .85@ 5.25 .85@ 5.25 .85@ 5.25 .75@ 5.25 .75@ 5.25 .00@ 5.25	Fuel oil alongside per barrel 1.10 1.10 1.10 1.10 1.10 1.10 1.10 1.	Diesel engine oil alongside per gallon 4.55½ 4.55½ 4.55½ 4.92 4.92 4.92 4.92 4.92 4.92 4.92 4.92	Coal trim in bunk per ton Feb. 18, 1931.4.85@5.25 Jan. 184.85@5.25 Dec. 184.85@5.25 Nov. 184.85@5.25 Oct. 184.85@5.25 Sept. 184.85@5.25 Aug. 184.85@5.25 July 184.85@5.25 May 185.00@5.25 May 185.00@5.25 April 18, 1930.5.00@5.25	Fuel oil alongside per barrel 1.00 .85 .95 1.00 1.05 1.05 1.05 1.20 1.20 1.20	Diesel engine oil alongside per gallon 4.88 4.88 4.88 4.88 4.88 4.88 4.88 4.	Boston, coal, per ton\$7.70 Boston, oil, f. a. s., per barrel

New Canadian Steamer On Modern Lines

By F. G. Milliken

between the noted seaports of St. John, N. B. and Digby, N. S., a distance of forty five miles the finely constructed new Canadian steamship Princess Helene went into commission on that extensively traveled route last season.

As a coastwise steamer, the new ship is noteworthy for size, speed equipment and luxurious accommodation, being 320 feet in length on the water line, 50½ feet beam, 18 feet deep to the main deck and 27¼ feet to the upper deck. She was built at Wm. Denny & Bros., Ltd., Dumbarton, Scotland, and is designed to carry a deadweight of 700 tons on a draft in salt water of 16½ feet.

The Princess Helene was built to the requirements of Lloyd's 100 AI, and to the Canadian and United States regulations, under the supervision of Dr. Douglas, naval architect, Glasgow, Scotland, and of Mr. Johnson, the company's superintending engineer. The hull is specially strengthened fore and aft in the vicinity of the water line as a protection against floating ice.

Her general appearance is like an ocean liner and she has accommodation for 500 pasengers, with several large and spacious rooms. They include the observation and main lounges, dining saloon to seat 74 persons, with 14 tables seating 4 each, and 3 tables seating 6 each. There is a large smoke room and ladies' room, also ample promenade and deck chair space. More than 50 automobiles can be carried.

Ample Passenger Quarters

There are 43 staterooms, affording ample accommodation for night occupancy and day crossing. This is very desirable on account of the morning departure of the ship, and patrons are not obliged to spend the night in a hotel.

Some of the staterooms contain single upper, double lower, and sofa, while others have single upper, single lower, and sofa, and a few are equipped with single upper, single lower, and settee. There are also several rooms with single upper, single lower, sofa, a shower bath and toilet.

The new steamer is owned by the Canadian Pacific Railway Co. and provides a most important and outstanding link between the sister provinces, and with corresponding improvements in terminal facilities.

The speed of the ship is 19 knots and the trip across the Bay of Fundy of about three hours, is most interesting and large numbers of American visitors to the Canadian provinces and enjoyment is such a short trip. The steamer's propelling machinery consists of two sets of single reduction geared turbines, each comprising high pressure intermediate pressure, low pressure, turbines, driving a common gear wheel. The turbines are of Parsons type,

designed to run at about 210 revolutions a minute at full speed. The steering gear is of electric-hydraulic type.

Steam is generated by a combination of multitubular water tube boilers. Oil fuel is used for the generating of steam and the fuel consumption is exceptionally low.

In parking cars on board it is not necessary to drain the gasoline tanks as the regulations permit of transportation with gas, but the flow from the tanks to the carburetors must be closed and all connections tight, so that there may be no leakage.

The gross tonnage of the Princess Helene is 4100. The accompanying illustration shows the ship arriving during high tide at the company's wharf at St. John, N. B.

At St. John, N. B., twice daily the tides rise and fall 22 to 24 feet and at certain times of the year are listed at 27 feet 7 inches. At no other place in the world are there such extreme high tides as in the Bay of Fundy along its north and east shores.

From the 1931 edition of tide tables for St. John, N. B., issued by the tidal and current survey division hydrographic service department of marine and fisheries, Ottawa, Canada, are given the following Canadian seaports some distance East of St. John where there are unusually high tides: Burntcoat Head, 501/2 feet; Avonport, 46 feet; Joggins Wharf, 411/2 feet; Sackville, 44 feet; Amherst Harbor, 45 feet; Parrsboro, 43 feet; Hopewell Cape, 43% feet; Grindstone Island, 41 feet; Windsor, 46 feet. These ports are principally on the Nova Scotia shores.

Starting Jan. 1, 1931, the steamer



Princess Helene, Canadian Pacific Steamship's New Steamer on Bay of Fundy. For Service Between St. John, N. B., and Digby, N. S.

PRINCESS HELENE leaves St. John, N. B., at 7:15 a.m., ariving at Digby, N. S., at 10:15 a.m., and leaving Digby at 3:15 p.m., arriving at St. John at 6:00 p.m., Atlantic time.

Plan Two New Submarines

Plans for the construction of the V-8 and V-9, last two of the nine fleet submarines authorized by act of congress Aug. 29, 1916, were announced Feb. 19 by Secretary of the Navy Charles Francis Adams.

construction of the V-8 was awarded to the Navy Yard, Portsmouth, N. H. Proposals from private shipbuilding companies for the construction of the V-9 will be opened in the navy department April 16.

Work Resumed on Liners

The chairman of the United States shipping board gave out the following statement on Feb. 20.:

"Negotiations incident to the adjustment of the construction loan granted by the shipping board to the United States Lines, Inc., purchasers of the board's North Atlantic passenger service, were concluded today upon the agreement, on the part of the New York Shipbuilding Co., to proceed on Tuesday next with the construction of the two large passenger liners now being built for the United States lines.

"P. W. Chapman, president of the United States lines, advised the board that he had requested Ira A. Campbell, Robert L. Hague, Edward N. Hurley and Franklin D. Mooney to serve on the board of directors.

McIntosh & Seymour Corp. Elect New Executive

A T a meeting of the board of directors of McIntosh & Seymour Corp. on Feb. 2, R. B. McColl was elected president and director to succeed A. E. Ballin, retired.

Mr. McColl was born in Kilmarnock, Scotland, in 1882, where he attended the Kilmarnock academy, and the Science and Art college. After



R. B. McColl

serving a special apprenticeship on the Glasgow & Southwestern railway at Kilmarnock, working in all departments, he left the company and was employed by Robert Stephenson & Sons, locomotive builders,

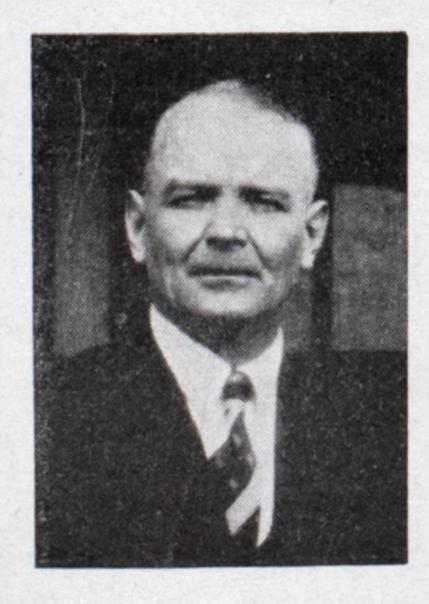
Darlington, Eng., as a draftsman. In 1905, he joined the Montreal Locomotive Works Ltd., Montreal, Canada, serving in various capacities and finally as works manager. He left the company in 1917 and was appointed manager of the munition department of the Eddystone Munition Co. where he remained until after the armistice, when he returned to England as manager of Armstrong Whitworth Co.'s locomotive department.

In January 1922, he returned to the American Locomotive Co. In 1925 he became manager of the Schenectady plant, which position he held until his present promotion.

Well Known Great Lakes Ship Designer Dies

NTHE death of William H. Landgrebe on Jan. 16 the marine industry of the Great Lakes suffered a big loss. He had been identified with the construction of the various types of vessels peculiar to the Great Lakes

and for most of that time was on the staff of the American Ship Building Co., with w h i ch he started h i s career at the Chicago plant in 1896 at actual construction work in that yard. For two years or



W. H. Landgrebe

more he was associated with the late W. J. Wood, naval architect of Chicago, while engaged in the design and construction of fire tugs, river boats, and other unusual types requiring special designing and supervision.

Mr. Landgrebe came to Cleveland in 1915 to join the drafting force of the American Ship Building Co. and was made chief draftsman in 1918, continuing in that position until his death. During the intensive shipbuilding program of the World war, the burden of preparing plans and ordering materials for the hulls of the numerous ships built by the company fell largely upon Mr. Landgrebe's shoulders. To him is due much of the credit for the vast amount of preliminary work to facilitate rapid production.

Elected Grand President At Annual Convention

CAPTAIN MILTON J. BROWN, past president of Cleveland Lodge No. 4 of the International Shipmasters association, was elected grand president of the grand lodge at the annual convention of the association in Mt. Clemens on Jan. 30. Captain Brown had served the unexpired term of the late Capt. Peter Cartwright who



Capt. M. J. Brown

died last Oc-Other tober. officers elected were: Capt. Mc-Thomas Dougall, Superior, Wis., first vice-president; Capt. Melvin Mackey, Milwaukee, second vice president; Capt. John H. Mc-Donald, Marine City, sec-

retary; Capt. T. J. Crockett, Port Huron, treasurer; Capt. O. A. Gentz, Chicago, chaplain; Capt. Wm. McDonald, Buffalo, marshal; Capt. Elmer Wolvin, St. Clair, warden and Capt. S. J. Kenworth, Algonac, sentinel.

Captain Brown began sailing on the Great Lakes in 1907 as a deck hand on the steamer Presque Isle of the Cleveland-Cliffs Iron Co.'s fleet, Cleveland, later becoming master of the ship. He has remained in this fleet ever since, being appointed second mate of the steamer Peter White in 1913 and master of the Andaste in 1922. During the past season he commanded the steamer Negaunee. During the terrific gale of 1913, one of the worst storms in the history of Great Lakes navigation, Capt. Brown was on the steamer Peter White when she was battered around for over 30 hours on Lake Superior off Grand island.

Wins Promotion on Staff of General Electric Co.

recently appointed assistant to the manager of the Federal and marine department of the General Electric Co. got an early start in the marine world by being born in New Haven, Conn. in 1894. There was still considerable of the tradition of shipbuilding and the clipper ships among the older people in those

dys, as New Haven had been a real trading port in the sailing boat days. "Bill," as he is known, went through the New Haven, schools and was graduated from Sheffield Scientific school of Yale university in



Wm. A. Thorpe

1914 after completing the course in electrical engineering. After graduation he joined the Union Switch & Signal Co., Swissvale, Pa., on railroad signal work, later leaving to become associated with the Grand Trunk railway in Montreal and later with the New York, New Haven & Hartford railroad at New Haven.

In February 1918 he enlisted in the navy, serving in various capacities and upon his return from France was commissioned ensign as instructor at the navy turbine school at Pittsburgh. With the signing of the armistice he resigned from the service and entered the employ of the ship propulsion section of the turbine engineering department of the General Electric Co., later being transferred to the federal and marine department. In this department he has been closely identified with the merchant marine work and the electric propulsion of the vessels of the Bradley Transportation Co.

He is a member of the Society of Naval Architects and Marine Engineers and the Yale Engineering association.

Dewey L. Pierce, for the past seven years affiliated with the marine battery sales division of the Electric Storage Battery Co., Philadelphia, has joined the brokerage department of Henry J. Gielow, Inc., New York. Mr. Pierce, well-known for his part in the development of floating battery systems for yachts and commercial boats, also has participated in a number of sailing races since 1908. He sailed aboard the Reverie in the Halifax races of 1926 and won the Indian Harbor Knockabout class in the Larchmont race series of 1924.

Changes in Personnel of United States Lines

A S a result of the promotions of Capt. A. B. Randall to master of the Leviathan and commodore of the fleet, following the resignation of Commodore Harold A. Cunningham, and Capt. George Fried, of rescue fame, to master of the George Washington, several changes in personnel were an-

nounced Feb. 10 at the offices of the United States lines, 45 Broadway, New York. Capt. A. M. Moore becomes master of the AMER-ICA, Capt. Hubbard C. Fish takes command of the REPUBLIC and Officer Chief



Capt. A. M. Moore

Harry Manning of the AMERICA Will be temporarily assigned to the AMERICAN TRADER.

Capt. A. M. Moore is a native of Maine and has spent practically his whole life at sea. He served during and after the war in the Army Transport service as an officer and took command of the George Washington for the United States lines in June, 1922. He has been chief officer of the GEORGE WASHINGTON, staff captain of the Leviathan and became master of the Republic two years ago. Aside from being extremely popular among north-Atlantic voyagers, Capt. Moore is noted for his ability as a seaman and navigator, and has been feted and decorated for rescues, notably his work in connection with the saving of the crew of the GANDER DEAL in mid-Atlantic in December, 1929.

Capt. Hubbard C. Fish, newly ap-

pointed master of the RE-PUBLIC, was born in Noank, Conn. He has been decorated by the Norwegian government for supervising the rescue of 34 members of the crew of the Norwegian freighter EL VIN, disabled in a north-At-



Capt. H. C. Fish

lantic gale in November, 1926. This feat also brought a letter of commendation from former President Coolidge. Capt. Fish served for four years as chief officer of J. P. Morgan's yacht, Corsair, and in the same capacity on O. H. Payne's yacht, Aphrodite, and Harry Payne Whitney's Whileaway.

After the war he became master of the Army Transport service liners Sherman and Princess Matoika and was appointed staff captain of the Leviathan in February, 1922. After two years' service on the flagship of the United States lines' fleet, he was given command of the American Trader of the American Merchant lines and has served in that capacity to date.

Harry Manning, who has been chief officer of the AMERICA, is now in temporary command of the AMERICAN TRADER of the American Merchant lines. Mr. Manning, one of the younger executive officers in the American merchant marine, was born in February, 1897, and is a graduate of the New York State Nautical Schoolship NEWPORT. He joined the United States lines in July, 1921, as fourth officer of the George Washington and became chief officer of the PRESIDENT HARDING in November, 1927. He. served with that rank on the REPUBLIC and in March, 1928, was permanently assigned to the AMERICA.

Mr. Manning received world-wide recognition for his heroic activities at sea when in January, 1929, under the supervision of Capt. Fried, 32 members of the Italian freighter FLORIDA were rescued.



Harry Manning

Merits Honor By Service

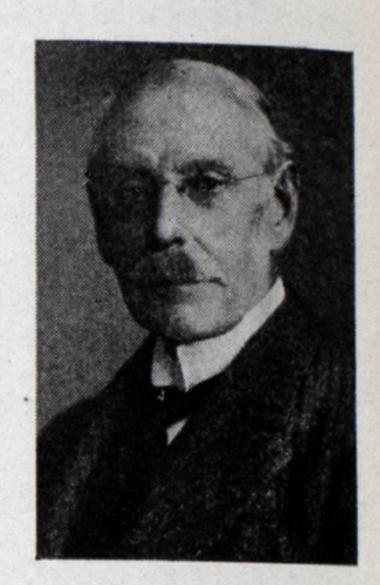
David J. Owen, general manager of the Port of London Authority, was recently knighted, a distinction conferred upon him in the New Year's honor list in recognition of the onerous and far-reaching importance of the duties attached to the administration of Britain's premier port. This post has been described as the "blue riband" of port administration. In relation to trade, the Port of London Authority is the most important public body in Great Britain.

Preparations have been started for the convention of the Association of Pacific and Far East Ports to be held in Vancouver Aug. 13, 14 and 15. Invitations have been issued to 86 ports in the Orient, South America, Mexico, Hawaiian islands, Philippine islands, New Zealand and Australia asking them to send representatives to the meeting. Headquarters for the convention wil be the Hotel Vancouver and details are being handled by Kenneth J. Burns.

Famous Engineer, Inventor of Steam Turbine, Dies

SIR CHARLES PARSONS, K.C.B., inventor of the steam turbine engine, died on Feb. 11 while on a cruise to the West Indies. He was 76 years old. News of his death came as a great surprise to his friends as he had left England in seemingly the best of health, despite his advanced age.

Sir Charles, who received the Knighthood of the Bath in 1911 for his services to the Royal navy, was born in London June 13, 1854, the fourth son of the third Earl of Rosse. From his early youth exhibited



Sir Charles Parsons

a talent for science and invention. At the age of 11, while cruising in his father's yacht, he designed a deep sea sounding gauge which was developed by Lord Kelvin and later put on the market. Upon completion of his education at St. John's college, he began his practical engineering work as an apprentice in the Armstrong plant at Elswick, Newcastle. During the three years of his apprenticeship there he invented an epicycloidal four-cylinder rotary engine with revolving cylinders.

His experiments which led to the perfection of the steam turbine were started in 1884. The original Parsons steam turbine which produced 10 horsepower and made 18,000 revolutions per minute is now in the Science Museum at South Kensington, London. The principle of the Parsons turbine, that of "pressure-compounding" or using several "simple" turbines in series, is an essential feature of all modern steam turbines of large output and high economy. The invention of the steam turbine revolutionized marine travel and made possible for the first time the crossing of the Atlantic by large liners in less than a week. His principles of generating power for liners of the MAURETANIA type have been adapted to merchant vessels, warships and virtually every design of ocean-going craft.

Although large works were established at Heaton-on-Tyne for manufacturing turbines, dynamos, and other similar equipment, it was not until 1893, when he founded the Marine Steam Turbine Co., that Sir Charles began his work of adapting the turbine to use in ships. The famous Turbina was completed four years later with 2300 horsepower steam turbines. She was 100 feet long.

World Shipbuilding Volume Is Lowest Since 1926

LOWER volume of world construction of merchant vessels than at any time since the end of 1926, due to a sharp decline in the work in the shipyards of Great Britain and Ireland during the quarter ended Dec. 31, is shown by a statement just issued by Lloyd's Register of Shipping covering all maritime countries except Russia. During the quarter for which returns have just been issued the world total showed a decrease of 243,000 gross tons the decline for Great Britain and Ireland alone being 207,000 tons.

As compared with the total building just before the war, throughout the world, the present construction total of 2,326,000 gross tons shows a decrease of 836,000 gross tons, and of this the decline for Great Britain and Ireland represents 813,000 tons. The shipyards of the United States, however, are building nearly 85,000 tons more than they were before the war.

During the quarter ended Dec. 31, Lloyd's Register points out, American shipyards showed a gain in work on hand of about 20,000 gross tons. Small gains were also reported for Germany, Sweden and Denmark; while, in addition to the decrease reported for Great Britain and Ireland, there were declines in France, Italy, Holland and Japan.

Comparisons of the volume of shipbuilding during the past two quarters in the chief groups of countries are shown by Lloyd's in the following table, the figures representing gross tons:

	Dec. 31, 1930	Sept. 30, 1930
Great Britain &		
Ireland	908,902	1,116,746
United States	232,030	212,974
Other countries		1,239,316
World Total	2,326,086	2,569,036

At the end of 1929, Lloyd's returns show, Great Britain and Ireland were constructing slightly more than half the world's volume of tonnage. At the end of last September, however, their proportion had fallen to 43.5 per cent, and in the quarter just ended it dropped to 39 per cent. The proportion of the United States' share in the work advanced from 8.3 per cent at the end of last September to practically 10 per cent; and that of all other countries combined from 48.2 per cent to 51 per cent.

There was a continuance in the quarter just ended of the conditions whereby new work secured by the world's shipbuilders falls short of replacing that being sent towards completion. During the three months ending Dec. 31, launchings represent-

ed over 200,000 gross tons more than the aggregate of new work begun. Again the disproportion was much the greatest in Great Britain and Ireland, where new work was 165,000 tons less than the volume of launchings; while for all other countries combined the shortage was only 40,000 tons. Lloyd's shows the contrasts between launchings and new orders in the following table, the figures representing gross tons:

Launchings	Dec. 31, 1930	Sept. 30, 1930
Great Britain &	004.004	050 500
Ireland	294,601	376,593
Other countries	327,998	328,214
World Total New Work	622,599	704,807
Great Britain &		
Ireland	128,875	158,344
Other countries	287,369	314,541
World Total	416,244	472,885

The volume of tanker construction also showed a decline during the quarter just ended, says Lloyd's, a decrease of about 125,000 tons being shown, as compared with the total at the end of September last. Here again the decrease is due to the falling off of the work in hand in Great Britain and Ireland, the decline there amounting to 151,000 gross tons. For the United States a decrease of 17,-500 tons is shown; but gains of 14,-000 tons are shown for Germany, of 10,000 tons for Sweden, and of 17,-000 tons for the other maritime countries combined. Lloyd's shows the contrast between the last two quarters in the following table of gross tonnage: Only steam and motor tankers of 1000 gross tons and upwards each, are dealt with in the returns:

	Dec. 31, 1930	Sept. 30, 1930
Great Britain &		
Ireland	388,897	540,318
Germany	143,250	128,545
Sweden	100,600	90,550
United States	50,000	67,500
Other countries	224,551	207,231
World total	907,298	1,034,144

Motor vessels bore the brunt of the decline during the quarter ending Dec. 31, the decrease in the current construction of these ships aggregating 226,000 gross tons, as against only 16,000 for vessels of all other types taken together. As a result, vessels equipped with internal combustion engines now represent about 57 per cent of world merchant shipbuilding, compared with about 60 per cent at the end of last September and 63 per cent at the end of last June. Comparison of the types of construction in the past two quarters

is shown in the following gross tonnage table:

	Dec. 31, 1930	Sept. 30, 1930
Motor Vessels Other types		1,559,334 1,009,702
World total	2,326,086	2,569,036

At the end of the September quarter, Great Britain and Ireland were building 196,000 gross tons more of motor vessels than at the end of December; and during the same period Holland's motorship construction fell off about 22,000 tons. The United States total showed a decrease of less than a thousand tons.

A comparison of motorship building during the past two quarters is given in the following tonnage table:

	Dec. 31,	Sept. 30,
	1930 .	1930
Great Britain &		
Ireland	440,276	637,154
Germany	176,650	148,565
Holland	152,713	175,680
Sweden	135,350	115,300
Denmark	103,430	94,580
United States	42,563	43,385

For oil engines the total indicated horsepower at the end of December was 1,051,662, as compared with 1,199,588 at the end of September. During this period the decline reported for Great Britain and Ireland brought that total from 332,785, to 229,428 indicated horsepower. Germany's total dropped from 187,070 to 163,070; Holland's from 131,990 to 123,420; and for the United States, from 41,314 to 22,144.

A gain of over 300,000 shaft horse-power for steam turbines was made during the quarter just ended, the total for all countries combined advancing from 757,315 shaft horsepower to 1,062,825. For Great Britain and Ireland, there was an advance from 225,965 to 402,975, and for the United States from 194,000 to 304,-100 horsepower in steam turbines.

The figures for reciprocating steam engines for all countries show a decline during the last quarter from 365,885 indicated horsepower to 279,575. Great Britain and Ireland's decrease was from 216,475 to 164,740; and that for all other countries combined, from 149,410 to 114,835.

The comparison of the various countries in the volume of tonnage orders during the past two quarters is shown by Lloyd's Register in the following table, the figures representing gross tons:

	Dec. 31,	Sept. 30,
	1930	1930
Great Britain &		
Ireland	908,902	1,116,746
United States	232,030	212,974
Germany	218,215	194,200
Italy	179,677	188,384
France	174,215	209,307
Holland	160,078	184,920
Sweden	145,750	125,660
Denmark	107,660	97,335
Japan	86,060	104,250

Lloyd's Register reports that there are now under construction throughout the world 13 vessels, each of 20,000 gross tons or more.

Up and Down the Great Lakes

Coal Trade Will Be Late—Welland Ship Canal—January Lake Levels— Re-elect Officers—Adopt New Safety Rules—Breakwater Construction

THE beginning of the lake coal trade is expected to be four to six weeks late this season, due to the stocks on hand and the disappointing movement off the docks so far this season. The lake business is the chief source of encouragement to the eastern coal operators following the slump in demand from the winter and spring seasons.

The probable dullness of the lake business this season, due to the unusually mild winter and low consumption, is seen in reports of salesmen traveling the dock territory securing early tonnages for boat loading this year. Companies which normally book a heavy advance tonnage at this season say that they have been unable to obtain a single order of consequence thus far. Lake shipments, which are virtually the only outlets of the eastern coal producers during the summer months, have provided summer running time for years. A near-record tonnage was dumped for the lake trade at the lower Lake Erie ports last season. The total came within a few thousand tons of the record established in 1929.

Coal companies owning docks or with dock connections naturally are in the best position for an early start of the lake coal movement. It is thought that these will start shipments to the lake docks as promptly as possible merely as a means of providing running time for their operations, similar to last year. docks along Lake Michigan and at Duluth, Superior, and Ashland last year piled up coal in expectation of normal winter weather. Instead the dock owners have left stocks of both domestic and steam sizes beyond any expectation, due to the balmy winter weather.

Large Vessels to Use Canal

When navigation opens for the coming season in the Welland ship canal, the size and draft of ships allowed will continue the same as prevailed at the close of navigation in 1930, namely present St. Lawrence canal size vessels up to a maximum draft of 18 feet.

It is expected that contractors' progress, mainly on dredging work, on or about May 24 will have advanced sufficiently to permit vessels up to 450 feet with a maximum

draft of 18 feet to pass through the canal, and that by July 1 lake vessels of all sizes with a maximum draft of 20 feet will be able to use the canal. This is equivalent to the conditions in the channels between Lake Superior and Lake Erie.

The date of opening of the canal every spring depends upon ice conditions and varies from April 15 to 25, with an occasional extreme date of May 1.

January Lake Levels

The United States Lake survey reports the monthly mean stages of the Great Lakes for the month of January as follows:

	Feet above
Lakes	mean sea level
Superior	602.12
Michigan-Huron	
St. Clair	
Erie	
Ontario	244.94

Lake Superior was 0.29 foot lower than in December and it was 0.16 foot lower than the January stage of a year ago.

Lakes Michigan-Huron were 0.29 foot lower than in December, and they were 1.41 feet lower than the January stage of a year ago.

Lake Erie was 0.23 foot lower than in December and it was 1.96 feet lower than the January stage of a year ago.

Lake Ontario was 0.36 foot lower than in December and it was 1.71 feet lower than the January stage of a year ago, 0.25 foot below the average stage of January of the last ten years.

Re-elect Officers

At the annual meeting of the Detroit and Cleveland Navigation Co. held in Detroit Jan. 27 all officers were re-elected. The nine directors of the company are also to serve another year. The following are the officers: James T. MacMillan, president; A. C. Angell, vice president; James R. Coulter, vice president and treasurer, and William K. Muir, secretary.

Lake Shipping Man Dies

James Thompson, 68, head of the James Thompson Dock Co., Erie, Pa., and well known in Great Lakes freight handling operations for the past 40 years, died suddenly at Phil-

adelphia on Feb. 15. Mr. Thompson was born in Erie and rose from messenger boy to head of one of the largest dock and stevedoring concerns in the country, operating freight docks at Erie, Buffalo, Baltimore, Philadelphia, New York and Hoboken. During the World war this company played an important part in the stevedoring operations of the American army at home and abroad. He was also head of the Eastern Coal Dock Co., Hoboken, and had supervision of the Pennsylvania dock at Buffalo and managed stevedoring operations in Baltimore, New York and other eastern seaboard terminals.

Adopt New Safety Rule

According to a statement from Washington Feb. 16, provision has been made for additional safety on all vessels operating on the ocean, in coastal waters and the Great Lakes. The new rule, adopted at a recent meeting of the supervising inspectors of the steamboat inspection service, requires that all ships plying these waters must be equipped with fire resisting bulkheads and fire screens. Under this rule, the new fire protection equipment must be able to withstand 1500 degrees Fahr. for one hour. It is claimed that this new rule is similar to the one created at the International Conference on the Safety of Life at Sea in London 1929.

Breakwater Construction

Plans are taking shape for important breakwater and jetty construction in the Lincoln park district, at Chicago, and elsewhere along the southern shore line of Lake Michigan. This work has been stimulated by enactment in the United States senate of a bill to give the Lincoln park board complete jurisdiction over a portion of Lake Michigan, extending 350 feet from the shore.

Under this plan, the Lincoln park commissioners are entitled to build a breakwater of about a half mile. Work already has been started to finish an incomplete breakwater. A jetty recently constructed in the Lincoln park district required about 4500 tons of structural steel and sheet piling.

The 1930 Record of Wrecks on the Great Lakes

By Carlos C. Hanks

REVIEW of the Great Lakes trade for 1930 shows that the season of navigation will make a good showing when compared with other seasons, except 1929, which marked all-time tonnage carrying records in more than one commodity. While there was some deflection in the iron ore movement, it held up well with several of the last ten seasons. The grain movement also compares favorably with the past, while the 1930 shipment of coal ranks second to the 1929 figures with an approximate total of 38,085,000 net tons, as compared with 39,383,842 net tons for the latter year.

It is gratifying to record that the past season did not begin to exact the toll in ships and lives that weighed so heavily against the tonnage records of 1929. Four small cargo-carrying vessels, aggregating approximately 4500 gross tons, together with a dredge and a drill boat went down. The loss of these vessels claimed 65 lives, of which 38 are accounted for by a dynamite explosion following a bolt of lightning. This disaster, while actually occurring in the St. Lawrence river, involves lake equipment and sailors, so it is included in this resume of the year's wrecks.

Though the loss of life is lamentably high, it does not begin to compare with 1929, when 111 people died in lake shipwrecks that claimed 19 vessels approximately 30,000 gross tons.

The first disaster on the Great Lakes and tributary waters occurred on the afternoon of June 26, when a bolt of lightning from an almost cloudless sky, set off twenty tons of dynamite, blew the drill boat J. B. King to kindling wood and killed 38 of her crew of 53 men. None of the survivors escaped injury. Prompt work by the crew of the United States coast guard patrol boat No. 211, first on the scene, saved several of the injured from drowning.

The drill boat, the second largest vessel of its type in Canada, and valued at \$250,000, was owned by J. P. Porter & Sons of St. Catharines, Ont., and was engaged at the time in blasting out shoals in the St. Lawrence ship channel at Hillcrest off Cockburn island, three miles west of Brockville.

The heavy loss of life was partially due to the practice of having the night shift sleep aboard the boat in quarters beneath the water line, and the majority of these men perished without having a chance to save themselves.

The next loss occurred on June 27, when one of Lake Erie's sudden summer blows engulfed the dredge Patapsco, working west of the peninsula off Erie, Pa. No lives were lost but only the boilers and a portion of her equipment could be salvaged by divers. The dredge owned by the Arundel & Monkers Construction Co., of Buffalo, was engaged on the city of Erie's new water intake project and her sinking involved an estimated momentary loss of \$30,000.

The same lake also claimed the next vessel lost as well as 15 of her crew when the cargo of the stone carrier George J. Whelan shifted during a squall early in the morning of July 29, and the steel boat rolled over and sank in 190 feet of water off Van Buren, N. Y. Captain T. J. Waage of Cleveland, chief engineer A. A. Walters of Sandusky, and a woman cook were among those lost. The six survivors, clinging to bits of wreckage. managed to attract the attention of the watch on the bulk freighter AMASA STONE, and were picked up and taken into Erie by that ship.

The WHELAN, owned by the Kelly Island Lime & Transport Co., Cleveland, was bound from Sandusky to Tonawanda with stone. Originally named the ERWIN L. FISHER, the boat was built in 1910, was 220 feet long, 40 feet beam and measured 1430 gross tons. During the war the vessel, being of canal size, was turned over to coast parties who renamed her the CLAREMONT. Recent years saw her return under Canadian registry to the lakes coal trade in which she was engaged until purchased by her last owners in the early spring of 1930. The WHELAN was abandoned as a total loss, estimated at \$150,000.

No other disaster occurred on the Great Lakes until the 40-mile gale of Sept. 26 and 27 lashed Lake Michigan to a fury that brought death to 12 persons and sank three small vessels. The first to succumb was the steel barge Salvor which broke loose from the tug RICHARD FITZGERALD and went ashore two miles north of the Muskegon harbor entrance on the afternoon of Sept, 26. Seven of the barge crew including two women drifted ashore on a life raft, while two more men were saved by coast guards after clinging to a partially submerged derrick for 16 hours. Four men and a boy were drowned.

The barge, which was bringing a cargo of stone from Gill's Rock, Wis., to Muskegon for use on a new break-

water, was owned by the T. L. Durocher Co., of Detour. She had a carrying capacity of 3,000 tons, was 253 feet long, 44 feet beam and was built in 1896 as a steamer the Jolly Inex. The Salvor was abandoned as a total loss amounting to about \$75,000.

The same afternoon marked also the passing of the last sailing vessel from Great Lakes service, when the gale overpowered and sank the old schooner Our Son twenty miles off Ludington, Mich. Captain Fred Nelson and his crew of six men were rescued by the freighter William Nelson. The Our Son was built in 1875, was 182 feet long, 35 feet beam and measured 720 gross tons.

The third storm victim was the 64foot, diesel-driven fruit carrier North
Shore, which went down somewhere
off St. Joseph, Mich. with Captain E. J.
Anderson, his bride of two weeks, and
a crew of five men.

No steel steamers must spend the winter on rocky shores as happened in 1929, and no constructive total losses confront the underwriters. The year's record of wrecks reveals once more the fact that all disaster due to stress of weather involved only older and smaller ships, while the modern bulk carriers again came through a season without a casualty.

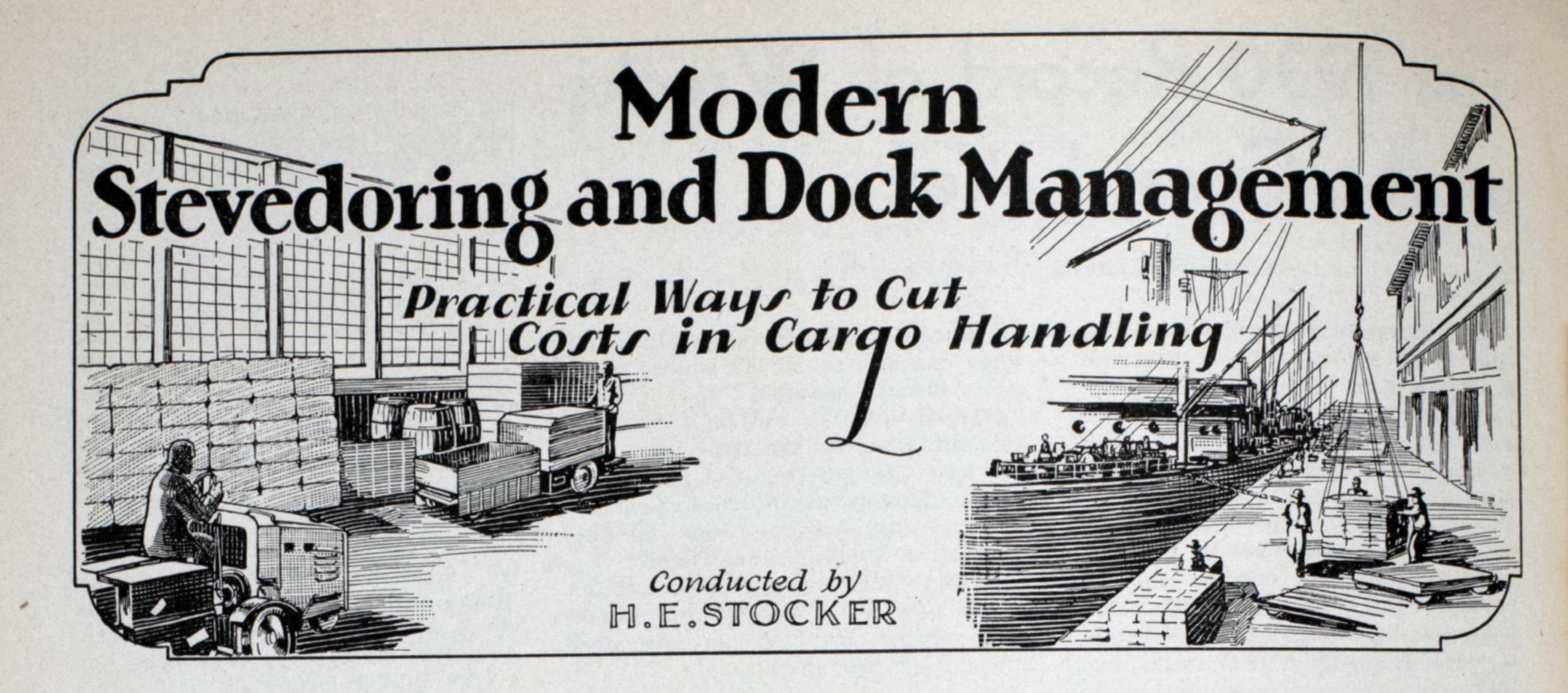
Finish Tanker at Chester

The 13,400-ton diesel bulk oil carrier Northern Sun, built for the Motor Tankship Corp., was launched at the yard of the Sun Shipbuilding & Dry Dock Co., Chester, Pa., on Jan. 31. The new tanker, one of the largest built in the United States, has a capacity of 4,000,000 gallons and is 500 feet overall with a beam of 67 feet. She is propelled by a Sun Doxford opposed piston type internal combustion engine of 2700 horsepower, driving a single screw, giving her a sea speed when fully loaded of 11 knots.

Her trial runs were held on Feb. 10 and the ship was scheduled to leave in ballast for San Pedro on Feb. 11. She was 95 per cent completed when launched.

Elected General Manager

Following a recent meeting of the board of directors of the New England Steamship Co., it was announced that effective Feb. 1, J. H. Lofland, marine superintendent of the New York, New Haven & Hartford Railroad Co., had been appointed general manager of the New England Steamship Co., with offices at Pier 14, North river, New York. Mr. Lofland, who is a graduate of Annapolis, was connected with the Newport News Shipbuilding & Dry Dock Co., for 16 years. He has been marine superintendent of the New Haven for the past six years and will continue in that capacity.



Keeping Freight Off Barge Deck Saves Days in Time of Discharging

By H. E. Stocker

THE Fay Transportation Co. operating on the Sacramento river and San Francisco bay, uses skids and gasoline lift trucks for loading and unloading its diesel propelled barges. The principal movement is canned goods from Sacramento and Rio Vista on the Sacramento river to San Francisco and Oakland on San Francisco bay. On the return trip up the river sugar and general merchandise are carried.

Formerly, when hand trucks were used, the barges discharged around 13,000 cases of canned goods in approximately three days. Operating with skids and lift trucks 11,000 cases are handled but instead of taking approximately three days to discharge, this cargo is discharged in

Each of the two barges in the service is equipped with a gasoline operated elevator which has a platform 10 x 12 feet. Each elevator is installed forward of the pilot house. The elevators are used to equalize the difference in water level at all points where freight is handled except at Sacramento where a shipside dock elevator is used.

One of the barges, the Yuba, shown in one of the illustrations has a length of 145 feet overall, a breadth of 36 feet and has a draft load of seven feet. Her capacity is 400 tons. There are 4000 square feet of housed-in deck space on the main deck. Two hundred skids may be carried on a trip. The Yuba carries

two gasoline lift trucks of 6000 pounds capacity. The other barge, the Sonoma, carries one gasoline lift truck of the same capacity. The lift platform of each truck is 28½ inches by 54 inches and has an underneath clearance of 11¼ inches. The platform rises 4¾ inches.

The skids which are of steel and wood construction have a platform 48 by 54 inches. This permits loading from 60 to 75 cases of canned goods to a skid, depending on the size of the cases. The cases are loaded on the skids at the sealer in the cannery and remain on the skids until delivered to the warehouse at San Francisco or Oakland. The cannery loads the skids on motor trucks, six to a truck, and carries them to the Fay Transportation Co.'s dock, where the motor trucks are unloaded by hand lift trucks. The gasoline lift trucks carried by the barges assist in unloading the motor trucks when not engaged in loading skids on the barges.

When the loading of the barges starts, the lift trucks handle approximately 50 tons of canned goods in an hour. This results in a low cost per ton handled and less damage because the cases are handled less.

The Fay Transportation operation is a good example of keeping the freight off the floor of the dock and the deck of the ship. By handling the numerous cases of canned goods at the cannery, the barges can be loaded in a few hours. When dis-



Where conditions permit, this is an excellent example of direct transfer from vessel to truck by using lift truck and skids. Skids are released quicker and more trips can be made per day.

charging, the loaded skids are removed quickly, 60 to 75 cases at a time.

The transportation unit, the barge, is kept transporting, the purpose for which it was designed, instead of serving also as a warehouse while being tied up at terminals waiting on an obsolete method of cargo handling.

The rapid handling of cargo is possible because the cargo is moved in large units and because power is used to move the large units. Power moving means economical moving because one man with a lift truck can pick up a load of 11/2 to three tons and carry it at a speed of 500 feet per minute. A man working with a two-wheel hand truck will carry 500 pounds 150 feet a minute. hand trucker will pick up his load in about five seconds and drop it in three seconds. The power truck picks up a load from six to 12 times heavier in four seconds and drops it in the same time.

The power unit with these important elements in its favor does more work an hour. Assuming a load of 3500 pounds, the lift truck will handle, on a 100-foot run, 196 tons an hour, as compared with 11.5 tons an hour for the hand truck. With a capacity load of 6000 pounds, 336 tons will be carried an hour. This is 29 times as much as one man handles with a hand truck.

Conveyors at Houston Used for Bagged Cargo

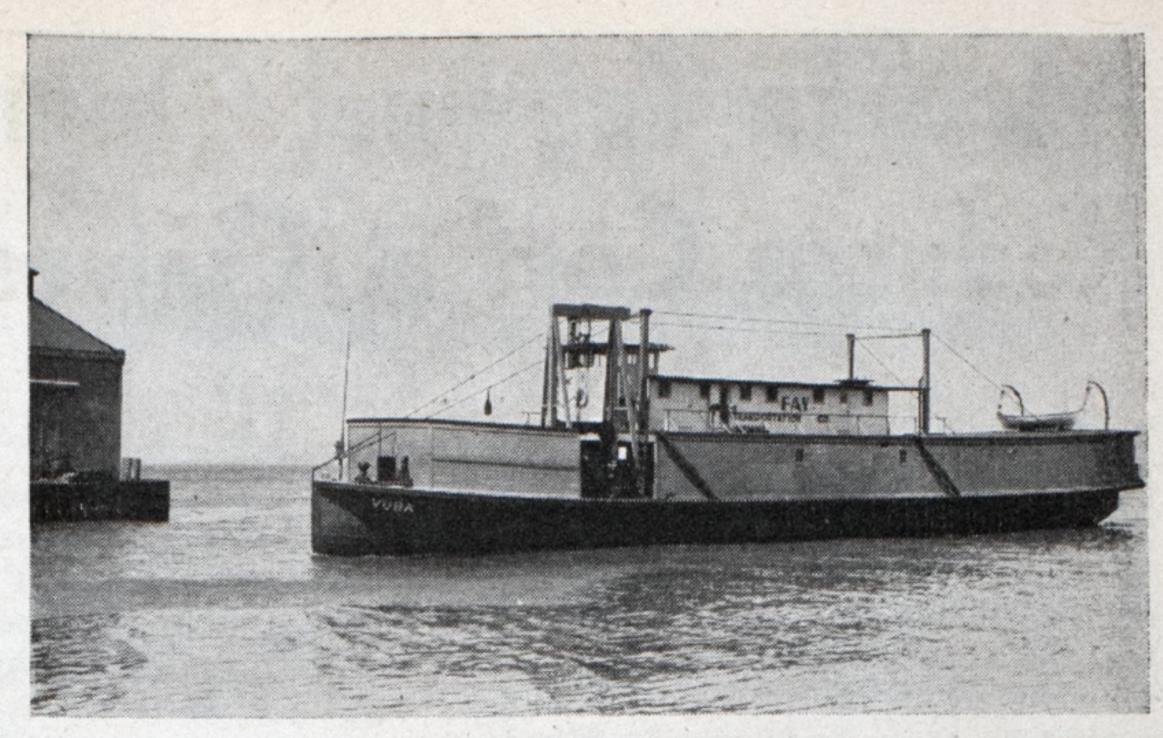
Belt and slat conveyors are used on wharf No. 4 at Houston to handle bags of coffee, sugar and other commodities from shipside to the warehouse in the rear of the transit shed, a distance of about 300 feet. The shed floor has an elevation of 11 feet above mean low water, while the warehouse has an elevation of approximately 35 feet above mean low water, so that the conveyor must elevate as well as transport.

The usual method on wharf No. 4 in handling bags of coffee, etc., from shipside to warehouse is to drop slingloads on platform or on shed floor. From either of these places the bags are handled by two longshoremen to portable belt or slat conveyors which carry the bags to the lower end of the main line slat conveyor referred to above, which make possible lifting the bags up from the dock to the warehouse elevation. The end of the conveyor is depressed to floor level for convenience in dumping cargo from the belt conveyor or from trucks.

Two to four portable conveyors are used alongside the ship according to the number of hatches being worked. The warehouse end of conveyor is approximately four feet above floor to facilitate the handling to belt con-

One of the Fay Transportation Co's. barges operating on the Sacramentoriver and San Francisco bay. The elevator installed equalizes differences in water levels at various docks.

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veyor or to trucks in operation.

The portable belt conveyors at the warehouse are used to distribute to the various sections of the warehouse. In some cases the conveyors have been extended to the south end of the warehouse, a distance of about 400 feet.

Hand trucks are used when necessary for distributing to the pile. The marks are separated at this stage of the operation. This is the reverse of the usual practice of separating marks at shipside, but it has worked very well in practice.

The belt and slat conveyors working together can handle from 4000 to 4500 bags of sugar an hour and from 2500 to 3000 bags of coffee in an hour.

The first conveyor installation was made in 1922. The conveyor arrangement was decided on by the designer of the terminal because between 80 to 90 per cent of the cargo was expected to move from ship into the warehouse. It was deemed advisable to sort the cargo in the warehouse and not on the dock, resulting in reduced handling and avoidance of delay to ship.

Houston as a Passenger Port

A LTHOUGH inland, 50 miles from the Gulf of Mexico, Port Houston is gaining some recognition as a passenger port. During 1930 not less than 50 ships carrying passengers stopped at Houston. There are four lines routing passenger ships through Houston. In addition special passenger ships frequently make the port.

Passengers from over the entire Southwest make reservations for foreign travel through the port of Houston. In addition to the principal European ports, passage may be booked for South and Central American ports. Houston has become a meeting ground for the old world and the new. Every year hundreds come by water to Houston.

The first large passenger liner to navigate the Houston ship channel was the Lafayette in 1925. The liner came to Houston to take a chamber of commerce delegation on a West Indies cruise. At the time of the huge liner's visit the pessimistically inclined declared it would run aground coming up the channel. The predictions proved groundless. Since 1925 passenger trade at the port has developed steadily.

The Portland Terminal Co. reports that the chisel trucks provided for the new terminal together with increased slingloads has increased discharging of bales of woodpulp from a former maximum of 900 tons in eight hours to 1500 tons in eight hours.

The new terminal at Portland is provided with rest rooms and adequate toilet facilities for longshoremen and dock workers.

At Houston, Tex. conveyors are set up on the wide apron of the wharf for moving bag cargo from shipside to the place reserved for it in the ware-house.



Modern Terminal Operation Reduces Cost at Galveston

By W. E. Ridgeway

THE property of the Southern Pacific Co. is located at the western end of the well developed portion of Galveston's fine water front, and the facilities include berthing space for five steamers, such berths being available at the north end of the pier and the slips located on the east and west sides of the pier.

Tracks serving these docks, as well as their arrangement, have produced one of the finest terminals in the country. The complete railroad switch track service permits the spotting of approximately 125 cars at a time, which indicates with what dispatch cargo can be handled.

The cargo pier is constructed with eight bays, each bay being served by two or more tracks, upon which the railroad cars are spotted and freight is thereafter handled direct from ship to car by electric lift trucks and skids, thus avoiding much rehandling necessary when the ordinary hand trucks are used. The platforms of the bays are on a level with the freight cars.

Prior to the arrival of each steamer, the agency staff at the pier, receives a stowage list of the incoming ship which reveals the character, quantity, location and interior destination of the cargo and with this information in hand, preparation for the immediate unloading of freight upon arrival and the loading into cars can be expedited to avoid any delay following ship's arrival in port. The advance receipt of this information

also permits the spotting of railroad cars in bays approximately opposite hatch or cargo port from which the freight is to be removed, enabling an orderly and systematic handling dispatch of cargo.

A large part of the carload shipments especially those in the upper and lower 'tweendecks are loaded on skids in the ship and are carried to cars by electric lift trucks. Less than carload shipments are discharged from the ship to a convenient position on the dock as near to the side port as possible and there sorted to skids which are spotted in this area. Separate skids are provided for each destination. When a skid is loaded it is taken to the proper car by one of the electric lift trucks.

This operation has made possible cutting down the trucking distances of hand trucks and has resulted in increased tons per man hour.

Good Planning and Equipment

There are a total of 12 lift trucks and 120 skids on the terminal. Each lift truck has a capacity of five tons. The skids used in this operation are heavy wooden platforms set into an iron frame with the platform just high enough from the pier floor to permit running one of the electric lift trucks under it.

The use of electric lift trucks has provided greater expedition in the forwarding of interior freight as the Morgan line record at Galveston shows that all freight is released to railroads approximately three hours earlier than prior to introduction of electric trucks. One skid will hold a number of ordinary hand truck loads of freight. This method of handling has been found very efficient both in time saving and in lower cost of operation.

In another section of the pier, not far from the unloading runways, is the space set aside for reconditioning any packages of freight that may have been damaged in transit. Broken packing cases are recoopered before being loaded into cars for shipment to their ultimate destinations.

Most of the cargo arriving from the East is finished merchandise being sent out through the Southwestern areas to jobbers and retailers. The commodities cover a wide range of merchandise and the values run into millions of dollars during the course of a year.

Arrangements for handling eastbound cargo are equally efficient. A ship to be loaded for New York or Baltimore is berthed in the slip at the east side of the pier, where two vessels at a time may be loaded if occasion requires.

This section of the pier has ample cargo room as well as a double rail-road track along the west side. Much of the eastbound cargo is moved directly from the freight cars into the ship on electric trucks.

Eastbound cargo is also of a wide variety of commodities, but much of it is made up of raw materials.

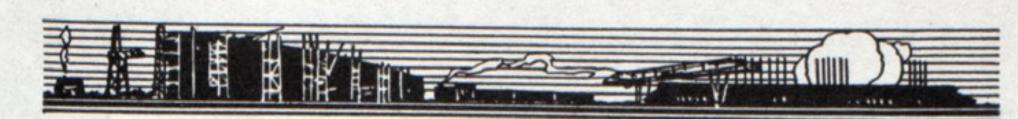
The author, W. E. Ridgeway, is assistant manager of the Southern Pacific Steamship Lines Galveston Terminals.



Package Cargo Transferred From Ship to Rails at the Southern Pacific Steamship Lines, Galveston. By Use of Skids and Trucks Cargo Handling Costs Have Been Reduced

Useful Hints on Cargo Handling





Browne-Morton's Stores, free and bonded warehouses, with offices at 611 Smith street, Brooklyn, N. Y. and ten warehouses on Smith and Bay streets, operate six electric trucks, load carrying type, for all of their materials handling work.

They are situated on the Gowanus Bay canal at Smith street and Hamilton avenue. All kinds of merchandise is shipped in to them via barges and automobile trucks.

As soon as a barge is made fast to their wharf, gang planks are used to bridge the gap between the barge and the wharf. The number of gangplanks used varies with the tide. When the tide is high, three planks are used, making a grade of almost 20 per cent that the trucks must negotiate in order to run on to the barge for a load.

After the truck is driven up the gang plank, on to the barge, it is loaded with whatever commodity happens to be on the barge. It might be a load of cocoa beans weighing 2000 pounds, or it might be a load of metals weighing 6000 pounds. The truck then starts its journey over rough cobble stones to one of the ten warehouses, varying from 100 to 1000 feet distance from the wharf. These warehouses line Bay and Smith streets, making it necessary for the trucks to operate in the street most of the time.

When the truck arrives at its destination, it is driven in the warehouse to the proper storage bay where the material is unloaded and stored away.

If the trucks are not loading or unloading barges, they are loading or unloading automobile trucks. The automobile trucks back up to the warehouse door, their loads are transferred



Finished lumber, in bundles, protected by layers of two by fours

THIS page is to be devoted to short items on all matters having to do with the more efficient turnaround of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

Baffles on Pier 9, Baltimore, to prevent locomotive smoke from spreading to storage areas. Smoke drawn through openings in ceilings

to the electric trucks and are then transported to storage, or else the electric trucks bring loads from storage to the automobile trucks.

In 1929, 60,000 tons were handled in and out of the various warehouses, making a total of 120,000 tons in all. Compared with some installations, this tonnage is small, nevertheless, because of the long hauls and the rough roadways, these trucks show a very substantial saving over hand labor.

Stevedores at Wilmington, Delaware, found it advantageous to use gravity cranes for loading steel.

Slings for Loading Cars

NE of the accompanying illustrations of the Tidewater terminals pier at Norfolk, shows the method used in loading Ford automobiles. The sling used is easily hooked on and unhooked, while at the same time the car is protected from any kind of damage.

This particular shipment was destined for Maracaibo, Venezuela and Havana, Cuba. From 500 to 600 Ford cars were being shipped monthly last year through the Norfolk Tidewater terminals to these ports. The cars are assembled at the Norfolk Ford plant.

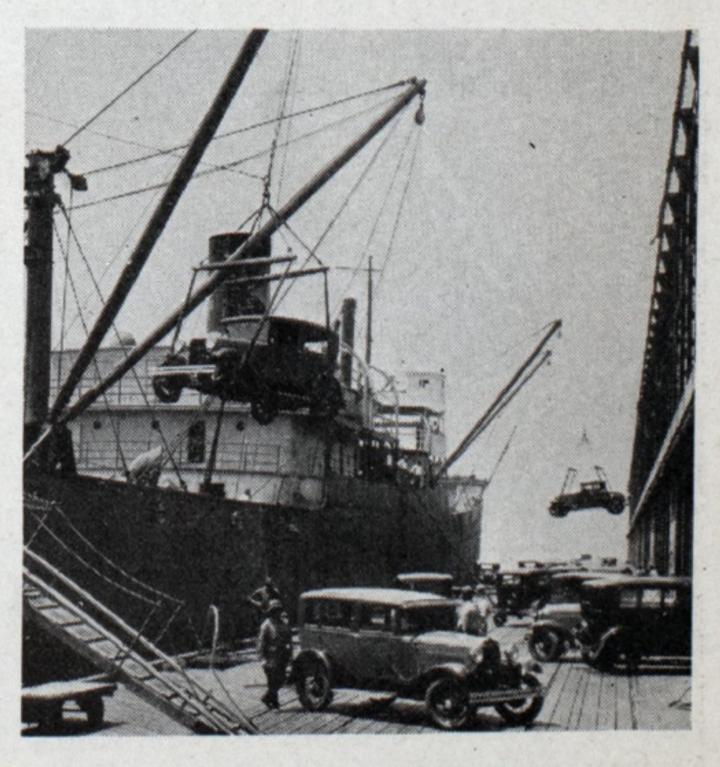
The practice of strapping lumber in units of equal size and length by use of steel straps and seals continues to grow on the Pacific coast. The units are shipped intact, grade marked, and reach the consumer in that form. Shortage and damage claims are practically eliminated and handling costs are reduced.

Cargo Booms and Hatches

THE placing of cargo booms the length of the booms and the number of them at each hatch is important. Ten years ago the standard length of a cargo boom was such that it would swing eight feet over the side when topped at a 45 degree angle. Today this is not enough, sixteen to twenty feet is required. Ten years ago two booms and winches were ample for each hatch, today twice that number are required if the gear is to be adequate.

Hatches should be made as large as possible, trade conditions permitting, in order to reduce the distance between the bulkhead and the hatch coaming. Transportation of cargo from the hatch-coaming to the bulkhead should be provided for by overhead monorail transportation, to avoid handling of cargo on other cargo and the swinging of slingloads and consequent dumping of slingloads.

Hatch covers should be of steel and 'tweendeck hatchbeams should be made to slide in the hatch coaming to avoid lifting them up.



Special slings for loading Ford cars at Norfolk Tidewater terminals

Reviews of Late Books

Practical Marine Diesel Engineering, by Louis R. Ford, M. A., second edition, revised and enlarged cloth, 772 pages, 6 x 9 inches, published by Simmons-Boardman Publishing Co., New York, and supplied by Marine Review, Cleveland, for \$7 plus 15 cents postage, and in Europe by the Penton Publishing Co., Ltd., Caxton House London, for 35s, postage extra.

This book deals with the construction and operation of the marine diesel engine from the viewpoint of the practical engineer. Owing to the rapid strides made in the development of the diesel engine since the first edition was published. the text has been revised to make it fully and accurately informative in regard to latest diesel engineering practice. The major portion of the book has been entirely rewritten and additional matter inserted. The preliminary chapters, dealing with fundamental facts, have not been altered other than to add some material in the interest of clarity. The section dealing with engine parts has been considerably enlarged to include important new developments in design practice. Liberal use is made of sketches and sectional drawing. A chapter has been added dealing with shipyard repairs of diesel engines. The chapter covering the subject of motorship engineer licenses has been brought up to date and a discussion added regarding requirements for obtaining a British engineer's certificate.

Maritime and Commercial Law, by Frederic Rockwell Sanborn, LL.B., D. Phil., cloth, 424 pages, 6 x 9 inches; published by the Century Co., New York, for the American Historical association, and supplied by Marine Review, Cleveland, for \$4 plus 15 cents postage, and in Europe by the Penton Publishing Co., Ltd., Caxton House, London, for 20s postage extra.

In this interesting and authentic discussion of the early English maritime law, Dr. Sanborn presents an historical study that is unique in existing legal history. There is no other history in English of early maritime law, nor has any such history been published in any language since the general work by Desjardins about 50 years ago.

The author undertakes to prove the unbroken continuity of the development of maritime law from Roman days to English. Also, he traces convincingly, in pairs of parallel chapters, the very close connection existing between maritime and commercial law during the medieval period

and points out the considerably wider scope of the words "maritime law" in those early days as contrasted with our modern usage. At that time, maritime law dealt also with the primitive branches of modern commercial law and the beginnings of international law. Admiralty lawyers, lawyers with a general commercial practice, and students of legal history will find a wealth of information in this very readable book. Sir William Holdsworth. Vinerian professor of English law in the University of Oxford, has written the foreword.

Resistance of Ships and Models, by N. W. Akimoff, cloth, 7 x 9½ inches, 136 pages, printed in Italy (written in English) and supplied by Marine Review, Cleveland, and by Penton Publishing Co., Ltd., Caxton House, London.

This new book is a treatise on new methods for estimating the effective horsepower of ships' hulls. It is divided into two parts, Part 1 being devoted to a brief history of the author's investigations, a synopsis of present day views and results, analysis, tables, thrust measurement tests, determination of effective horsepower by the usual tank methods abnormal values of propulsive coefficient, general deductions and suggestions and answers to possible objections, desiderata and conclusions. Part II deals with the mechanism of the wake, general remarks on turbulence and trip wire principle. The text throughout is amplified with illustrations and drawings.

What the British Are Doing in Shipbuilding

THERE were launched all over Scotland in January 13 vessels aggregating 32,979 tons gross. Of that total, eight vessels of 31,642 tons were built on the Clyde, three of 720 tons were launched in the Aberdeen area, and two of 617 tons in the Forth district. The Clyde total compares with 15 vessels of 31,910 tons in January last year, and the present figure is above the average for the month.

THE only order of importance booked by Clyde shipbuilders in January was that placed with William Simons & Co. Ltd., of Renfrew who have contracted to build a large twinscrew suction hopper dredger. The new vessel will be similar to the powerful dredger Rietbok built last year by William Simons for the South African railways and harbors administration. This work will provide

about a year's employment for their workpeople.

JUGH McLean & Sons who have just completed the lifeboat contract for the Empress of Britain, building at Clydebank, have secured the lifeboat contracts for the five new P. & O. liners at present under construction. The same firm have also the lifeboat contract for a large passenger liner in France, comprising 28 lifeboats.

THE first shipbuilding contract for 1931 has just been placed on the Tees. A valuable Canadian order for two oil-tankers of 2740 tons each, secured by the Furness Shipbuilding Co. Ltd. of Haverton Hill has a distinctly pleasing feature, in that it represents a flattering tribute to the high standard of Tees-built ships. The two ships

have been ordered by entirely new clients to the Furness Co. and they are to be of a similar type to other tankers which have been sent out from the Haverton Hill yards to do oil carrying service on the Canadian lakes. The new ships will be 257 feet in length and of 2740 tons deadweight. As quick delivery is demanded the keels will be laid down at once, and within the next few weeks additional shipyard hands will be taken on. At present there are two very large whalers on the stocks. These are of over 500 feet in length and 21,000 tons deadweight.

THE largest and most powerful vessel launched last month was the motorship Opawa built by Alexander Stephen & Sons Ltd. Linthouse, for the New Zealand Shipping Co. She is similar to the Orani which is at present being fitted out.

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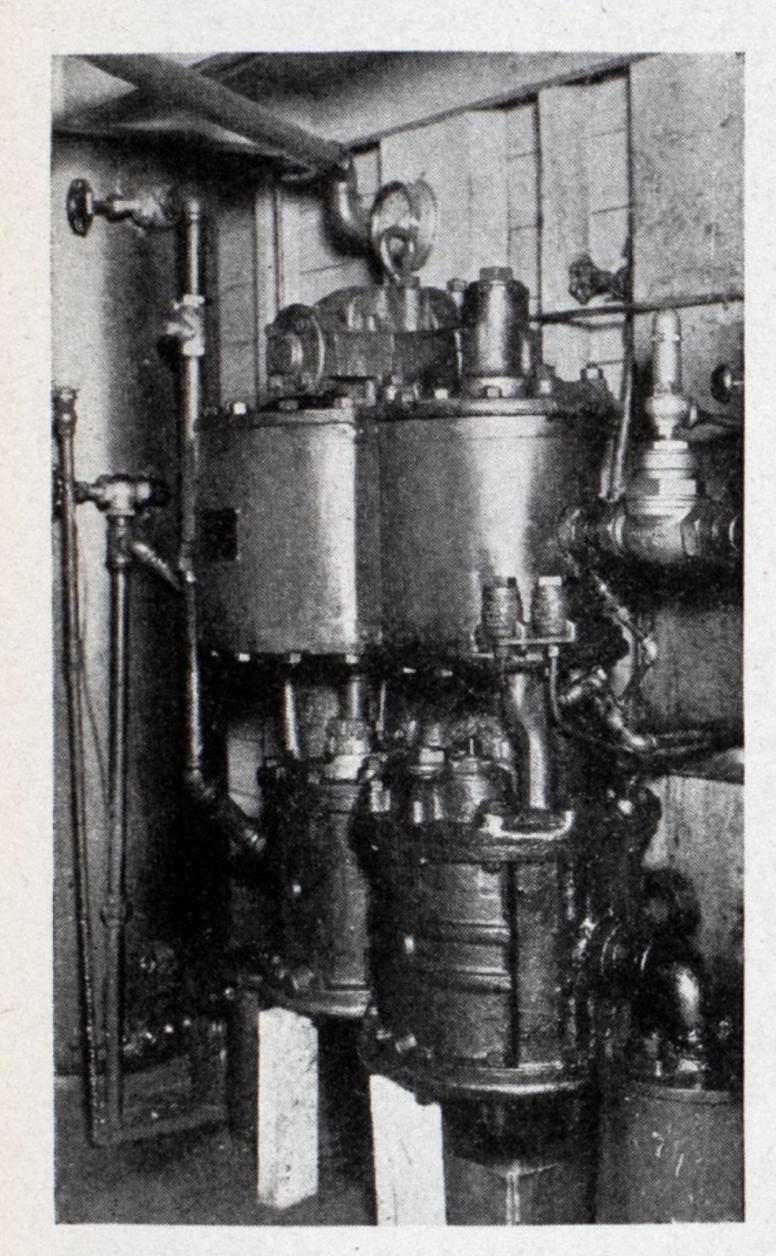
Equipment Used Afloat and Ashore

Air Compressors in Harbor Work—Electric Glue Pot
—New Type of Cargo Winch for Noiseless Operation

A INTERESTING account is given below of the various uses of Westinghouse air compressors in San Francisco harbor.

These compressors, installed on the pile driver of the state board of harbor commissioners are used to supply air for the operation of drills, augers, chippers, riveters paint-spraying and any other use to which air can be put in connection with the construction and maintenance of modern wharfage facilities.

A steam driven compressor lends itself peculiarly for use in marine



Westinghouse 10½-inch Compressor used in San Francisco Harbor

construction work. A number of men are assigned to a given pile driver and while the men are driving piles the steam generated by the boiler is used for operating the hammer. When they are through driving the piles, it is necessary that the piles be bored for bolts and the piles tied together by means of timbers and stringers. This entails a tremendous amount of boring, which is now being done with air.

When the men are using air operated tools they are not running the hammer; therefore, the steam is available for the compressor. If they were using other than a steam driven compressor, the steam boiler on the pile driver would be performing no useful work except while the piles were actually being driven.

Where concrete piles and bulk-heads are used, the air is then used for drilling and chipping and where steel is encountered, the air is needed for the purpose of scaling, drilling, riveting, painting, etc.

New Electric Glue Pot Is Compactly Built

COMPACT device which can be carried to the job, thereby eliminating the necessity of taking the work to the glue pot has been marketed by the Black & Decker Co., Towson, Md. This portable trouble saver, an electric glue pot, maintains the glue at a constant temperature of 150 degrees Fahr., which gives the best working consistency for smooth tight joints.

The heating element in the unit is a nichrome ribbon with mica plate and thermostatic control. The latter insures consistency of temperature at all times. The glue container of two quarts capacity is made of cast aluminum, carefully machined to fit a gray iron receptacle, assuring conservation of heat.

In order to eliminate the possibility of fire hazards and the dangers of short circuits, and other troubles, this nichrome heating element is tightly sealed with asbestos. The sides of the pot are sloped to reduce spillage to a minimum. A heavy iron wiper across the center of the glue container prevents loss from drippage.

Being a distinct scientific advance over the old style glue pots, this electric glue pot is practically indispensable wherever glue is used.

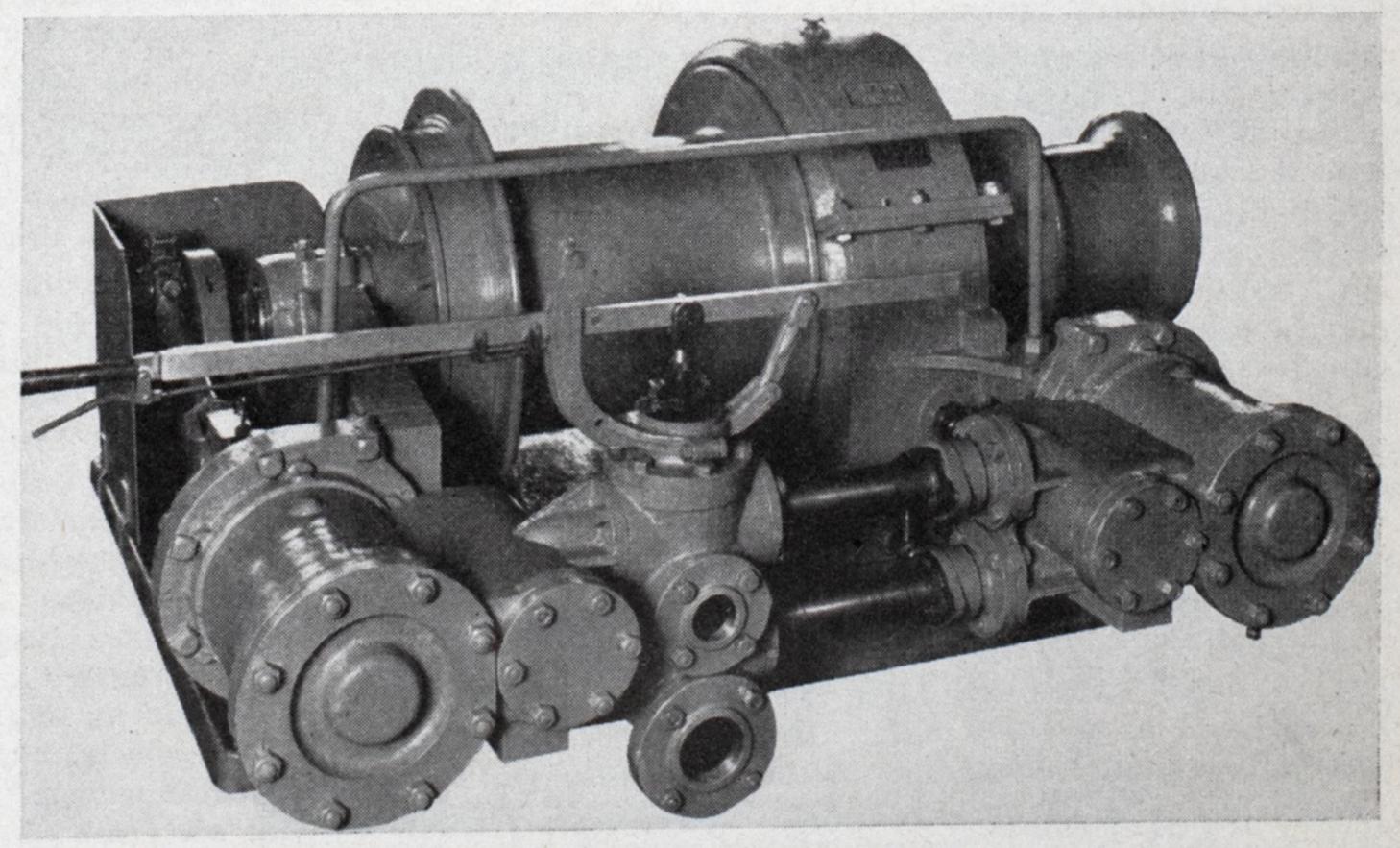


New electric glue pot with a capacity of two quarts

New Steam Cargo Winches Claimed to Be Noiseless

A NEW steam cargo winch which is suitable for use on combination freight and passenger vessels and which is claimed by the manufacturers to be noiseless has been developed by Allan Cunningham, Seattle, Wash.

This new device, which is shown in an acompanying illustration, is said to be much more efficient than some of the older types of winches. According to the makers, it requires less steam, operates very smoothly, and starts without jerk or friction, resulting in less wear on rope and wires. It is also claimed to have 30 per cent greater capacity than older types.

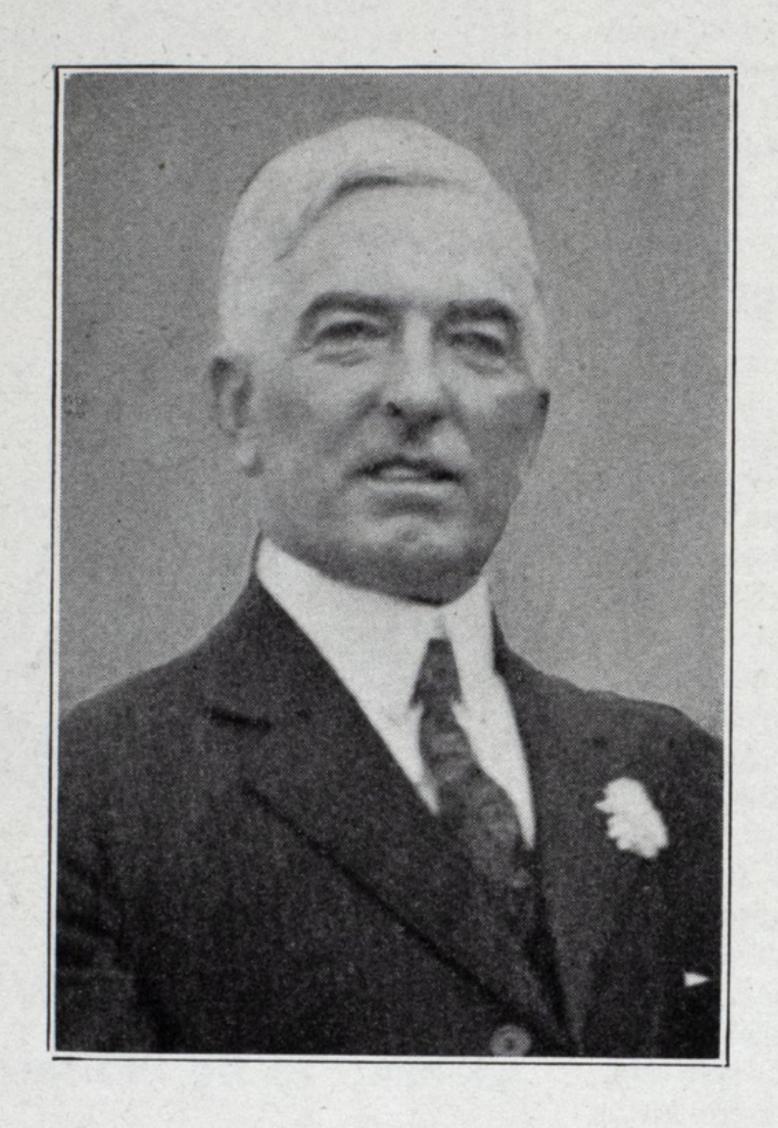


Steam cargo winch which has been recently developed

Personal Sketches of Marine Men

Capt. H. A. Cunningham, Joins Standard Shipping Co.

By Ben K. Price



FROM cabin boy on a Long Island steamer to command of the Levia-Than, his progress has been steady.

HIS service in command of troop transports was of exceptional value to the country during the war.

His record afloat as an organizer holding the esteem of his men predicates success in his new duties.

IGH up in a building at a world-famous address, 26 Broadway, a man watched intently the movement of a world-famous ship as she glided silently down the Hudson, past the Statue of Liberty, through the Narrows and on out to sea. Undoubtedly he envisioned himself on her bridge, where he had spent innumerable hours-often long, tedious, wearisome hours, as well as pleasant, prideful ones; and probably, too, his mind turned back to his early association with that ship, to the days of the war, when he, as navigating officer, had brought her, a troop ship, into dock at Hoboken, under cover of darkness, unaided by harbor pilot or tugs. To him, likely, she was more than a ship; she was a symbol of 32 years of active service at sea, in which he rose from a cabin boy on a Long Island sound steamer to ranking senior officer of the American merchant marine.

In the recent resignation of Commodore Harold A. Cunningham, the Leviathan has lost an able and gallant master, but the Standard Shipping Co., Standard Oil Co. of N. J. subsidiary, in his appointment to its executive staff, has gained a superb organizer and a seasoned and practical shipping man.

The exact nature of his new duties has not been announced, but persistent rumors point to a more centralized control of the company's various fleets, comprising one of the largest aggregations of vessels in the world. The group includes surely the largest number of tankers, with close to 50 vessels registered under the American flag alone.

Commodore Cunningham first came into the public spotlight, when as mate of Momus, he had the distinction of taking the first attachment of American troops to France. Then shortly he was made navigating officer of the seized German liner, Vaterland, later renamed Leviathan and reconditioned as a troop ship. He was elevated to the rank of lieutenant commander in the naval reserve.

Following he was master of Mount Vernon, army transport, and then Sahale and Amphion. Subsequently he

entered the United States Steamship Co.'s service as commander of Panhandle State, running between New York and London, and later of the Continental State. In 1925 he took over command of George Washington, the youngest man to have ever assumed charge of a ship of her size, and shortly after he succeeded Herbert Hartley, as master of the United States lines' greatest ship.

Ruddy complexion, blue eyes, hair gray, medium height—slightly under five-foot, 10—slender, but well knit—such is the brief description of Commodore Cunningham.

He was born at Sag Harbor, Long Island, the grandson of an old whaling ship captain. After attending high school at Greenport, Long Island, he shipped at the age of around 15 on the Sound steamer Shinnecock, which plied between Sag Harbor and New York. It was in 1909 that he obtained the berth on the Morgan liner, Momus, in the New York-New Orleans trade.

With his deep interest in seaman welfare, it is not surprising to find him a charter member of the Neptune association, New York, which has contributed so much constructive effort in this direction. In fact, he was president of this organization for two terms and is a trustee.

His diversions include golf, which he took up a few years ago and for which he has had to answer to his seafaring friends. Now that he has taken a "land" job, they insist that it was the influence of the game. He is excellent at cribbage and other card games; was perhaps one of the best shuffle board players afloat; and has a penchant for flying. His home is at Glen Ridge, N. J., where he resides with his wife and two daughters.

Commenting on Commodore Cunningham's service at sea, at the time of his resignation, Joseph E. Sheedy, executive vice president of the United States lines, said: "He has an enviable record as navigator, and although a strict disciplinarian, every man under him held him in highest esteem." And, it may truly be said, too, that in all his years at sea there never had been a single serious accident charged against his record.

American Transatlantic Line

(Continued from Page 15)

size, speed, and excellent behavior in heavy weather, as also their interior elegance, marked them as decidedly the finest ships of their time. In contrast, the four ships built for the new American Steamship Co. in the 1870's have been practically forgotten.

Yet this quartet succeeded notably in that prime mission of all merchant ships, the earning of profits, where the Collins steamers failed miserably. The Philadelphia liners broke no records of course, for they were not built for such expensive work. But they served on the Atlantic for something like a quarter of a century, for the greater part of their career remaining the only liners on the Atlantic flying the American flag. Let us have a close look at these unsung heroes.

The first ship was launched Aug. 15, 1872, receiving the name Pennsylvania. She inaugurated the service of the line May 22, 1873, with her departure from Philadelphia on that date for her maiden voyage.

Particulars of the Pennsylvania

The Pennsylvania was a fine steamship of rather more than average size. She measured 3104 tons gross register on dimensions of 343.0 by 43.0 by 31.9 feet, the length over all coming to 355 feet. Her engines consisted of a conventional two-cylinder compound set of the now prevailing inverted direct-acting type. The high pressure cylinder was 57 inches in diameter and the low pressure of 90 inches; both cranks were driven at a piston stroke of four feet. There were three cylindrical boilers of the double-ended type, with a steam pressure capacity of 60 pounds to the square inch, a high figure for those days, the limit then being about 70 pounds on the seas; altogether the furnaces were 18 in number. Quoted as of 500 nominal, the installation was credited as being capable of developing over 2500 indicated horsepower.

It was stated on good authority that the rate of consumption was at 40 tons coal per day. According to this the engines, working just on the double-expansion plan recently popularized, must have been remarkably efficient for the times. A pound and a half of coal per indicated horsepower per hour was certainly the last word in economy then. In comparison, the latest Cunard installation yet required about two pounds; to be exact, the Sidon's new compound engines of that year were rated at 1.96 pounds per indicated horsepower per hour, while those of the newly-built NANTES had a consumption of 1.95 pounds.

The Pennsylvania's screw propeller was of a four-blade design, measuring 17 feet in diameter and having a pitch of 24 feet. There was just one funnel.

She was fitted with accommodations for 76 passengers in the first cabin, and for approximately 800 in the intermediate class and the steerage. Her crew numbered 90.

There was deadweight capacity for 1760 tons of cargo plus 800 tons of coal in the bunkers. At a capacity load the ship drew about 20 feet of water. Her cargo space was reported as of 3854 tons measurement, or for 5141 bales of compressed cotton.

Total Cost Only \$600,000

According to an official statement by the company the cost of the Pennsylvania, complete, ready for sea, came to about \$600,000.

The second vessel, the Ohio, was launched Oct. 30, 1872, and placed in service in August of 1873. The third, the Indiana, took the water March 25, 1873, and commenced running in October following. Finally, the Illinois appeared in service in January, 1874. These later units were repetitions of the Pennsylvania, all four ships having been constructed to precisely the same design.

The building contract had stipulated an average speed of 11½ knots for the vessels, the expectation being however that they would merit a 13-knot rating. Let us see.

Their ocean course lay between Cape Henlopen and Queenstown, which was figured as being, for their speed, about eight hours longer than the New York-Queenstown route.

Taking as an example the performance of the Illinois as detailed in an article published in a contemporary issue of the Nautical Magazine, we observe that from March, 1874, to February into March, 1876, this ship engaged in eighteen round voyages across the Atlantic-her second to nineteenth inclusive. Through this two-year period, over the Cape Henlopen-Queenstown stretch, the average running time of the Illinois to the eastward was 9 days 15 hours and 26 minutes and the average speed 12.62 knots; to the westward the figures worked out at 10-21-38 and 11.16 knots. The mean of the thirty-six passages both ways was 10-6-32 or 11.89 knots. Thus she more than lived up to the promise of 111/2 knots in service.

Best Passage at 13.66 Knots

In the course of that period her quickest passage to the eastward was done in 9-3-13, and as she covered a total of 2995 miles thereby she maintained what was likewise her best average speed in that time, 13.66 knots; the occasion was her thirteenth voyage, June, 1875. To the westward her best time was 9-15-13, over a course of 2960 miles, the speed—12.80 knots—being also her best average in that direction (voyage No. 11, April, 1875). So, striking a mean of her best averages both ways to neutralize the wind and current conditions pe-

culiar to the transatlantic routes, we may conclude her to have proven rather better than a 13-knot ship.

However the Ohio had on one occasion crossed in the time of 8-23-0, corresponding to a smart New York run of 8-15-0. The Pennsylvania did still better, at 8-19-12. But this latter feat was decidedly eclipsed by the Illinois, and as late as October, 1880, when she ran from Queenstown to Cape Henlopen in 8-10-34, a performance that would have done credit to even the early White Star liners.

In rank among transatlantic steamships, then, these American liners corresponded pretty well to those crack German liners of their time, the Frisia, Pommerania, Neckar, and Oder.

What excellent workmanship had entered into their construction can be appreciated from a paragraph that appeared in *Engineering* (London), in the issue of April 6, 1877:

"American Steam Shipbuilding—The four steamers of the American Steamship Co., the Pennsylvania, the Ohio, the Indiana, and the Illinois, all built in Philadelphia and of American iron, are stated to have made such a favorable impression on English underwriters that they have been accorded a rate of insurance lower than that of any other steamers in the transatlantic trade, two of the Cunarders excepted."

General Grant on World Tour

In entering upon his memorable trip around the world upon the conclusion of his second term as President of the United States, General Grant departed from Philadelphia for the first leg of the tour May 17, 1877, aboard the Indiana.

The American Steamship Co. must have done a prosperous business in those early years, for although its quartet of liners were kept in continuous operation, it was yet found advisable to engage additional tonnage to run with them. It was in respect to such a supplemental vessel that the line sustained a reverse, when the chartered Abbotsford was wrecked off Anglesea, June 19, 1875. This Abbotsford was a British steamship of 2554 tons gross, built in 1873. However, the event was unattended by loss of life.

Around 1880 the earnings dropped off to some extent. In the years following the service was carried on in conjunction with several new British steamers, the British King, the British Queen, the British Crown, the British Princes, the British Princess, the Lord Gough, and the older Lord Clive, vessels ranging from 3300 to just under 4000 tons gross.

Steamship Co. there had been organized at Philadelphia in May, 1871, the International Navigation Co., in which officers of the other company were also interested. This International Navigation Co. in the course of

time acquired the control of the new Belgian-American Navigation Co., which was to become better known as the Red Star line.

In 1884 the International Navigation Co. took over the business and ships of the American Steamship Co. itself, and in 1886 purchased the controlling interest in none other than the great Inman line of British mail steamers.

Under the new management the Pennsylvania, Ohio, Indiana, and Illinois were remodeled to some extent. The first class accommodations were discontinued, as in that new greyhound era it was no longer easy to attract saloon passengers for older ships. The vessels were thereafter operated in the emigrant and cargo traffic.

In the middle of the 1880's the economical triple-expansion style of engine came into its own. Not only were new ships now thus engined, but many older vessels were refitted with such installations to bring them up to date. Among the first of the latter was the Ohio, which in 1887 received new triple expansion engines, together of course with new boilers to deal with the higher pressures involved. James Howden & Co. Glasgow, who supplied the plant, further equipped her with the new Howden system of forced draft, the Ohio thereby becoming the first Atlantic liner to possess this new feature.

In 1891 James Howden & Co. also re-engined the Indiana. In the same year William Cramp & Sons themselves fitted their other two products, the Pennsylvania and the Illinois, with new triple expansion engines.

The vessels also underwent a slight change in appearance in the course of their career. As late as the 1890's sails still formed a part of the equipment of even sizable steamships, and when they were built these four American steamers were rigged in brig style. In their latter days, however, the Pennsylvania, Indiana, and Illinois were registered as brigantines, and the Ohio as a bark.

Though the useful life of a ship is usually stated as twenty years, the quartet under discussion were still going strong in their third decade. Toward the close of the 1890's they appear to have entered upon a new period of service in other parts, being sold to Pacific owners.

The International Navigation Co., in acquiring successively the Red Star line, the American Steamship Co., and the Inman line, ultimately in 1893 consolidating them under the name of American line (the Red Star line retaining a distinct identity to a certain extent for its definite good-will significance), was merely gathering up some of the threads that were to enter into the fabric of the great I. M. M. system, of such current influence in the development of our merchant marine.

Re-elect Bureau Head at Annual Meeting

At the annual meeting of the American Bureau of Shipping in New York on Jan. 27, Capt. C. A. Mc-Allister was unanimously re-elected president for the sixth consecutive year. G. P. Taylor, H. N. Herriman and J. Lewis Luckenbach were re-elected vice presidents and J. W. Cantillion secretary.

In his annual report to the board of managers, Capt. McAllister said that 1930 had been a prosperous year for the bureau, as it had classified 88 per cent of the total output of American shipyards.

The work of the bureau on river craft has gradually been increased and recently it received orders to inspect and classify forty large barges for the Inland Waterways Corp. The gradual disappearance of wooden craft in the United States was shown in a comparison of surveys made—5873 on steel vessels and only 121 on wooden vessels.

United Dry Docks Acquires Truss Weld License

The United Dry Docks Inc., 11 Broadway, New York, has acquired the exclusive license on the Atlantic coast to the Kjekstad patented truss-weld and reverse channel systems of ship, barge and tank construction. J. Kjekstad, inventor of the two systems and formerly president of the Truss-Weld Barge Co., has joined the truss-weld division of United Dry Docks as consulting engineer. A. Hudson, formerly vice-president and sales manager of the Barge company, is sales manager of the truss-weld division.

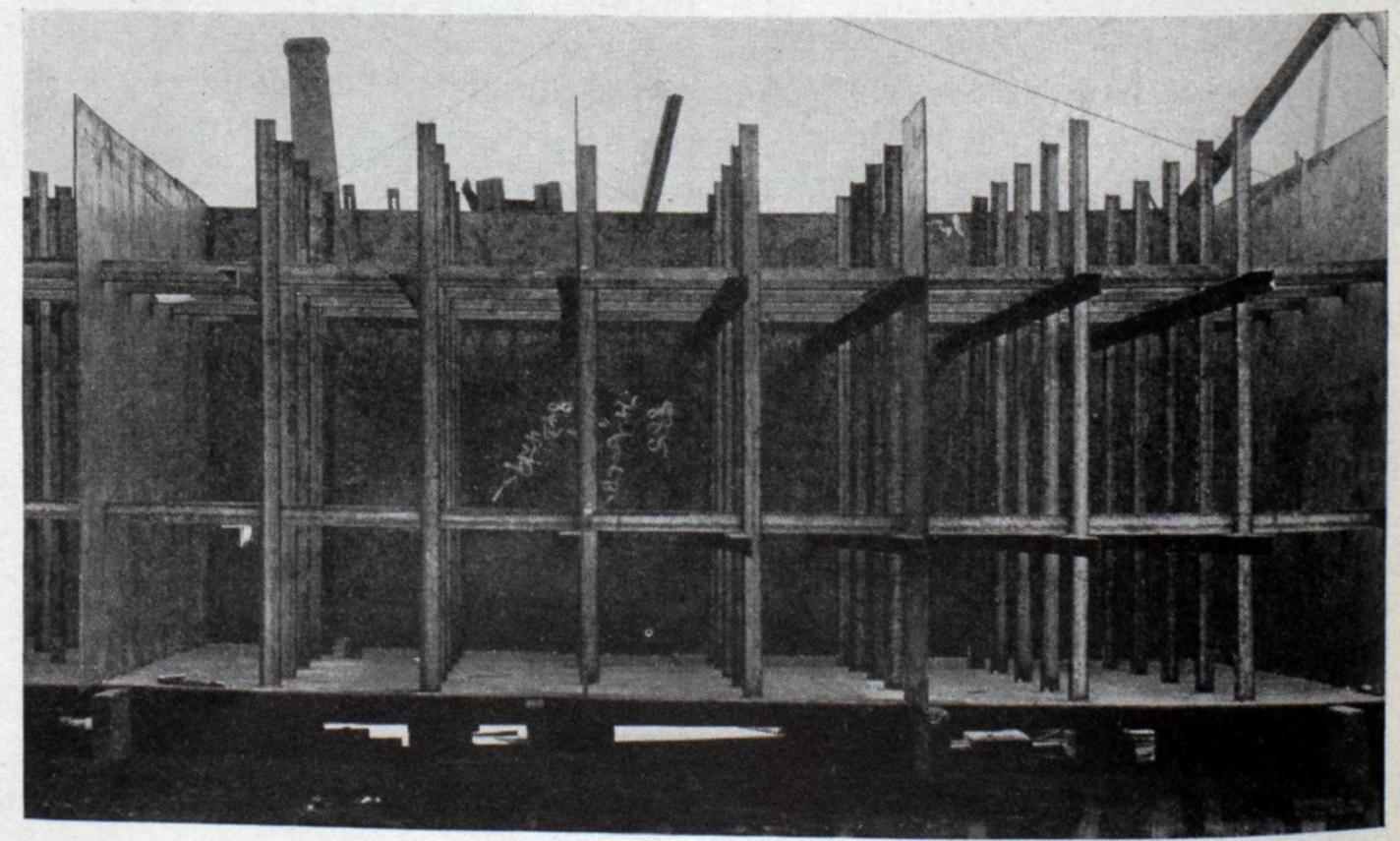
Under the truss-weld method an internal structure of angle member trusses running longitudinally, athwartship and vertically is set up,

all trusses being welded at intersections and to the skin of the hull. Electric welding is employed throughout and thus the method eliminates all riveting and practically all heavy internal members such as keels, ribs, beams and even frames.

The first ship built under this system, a self-propelled oil carrier, has been in use in Canadian waters nearly three years and has an unbroken operating record, although the ship has served frequently as an ice breaker in the St. Lawrence and has figured in collisions and groundings, without fracture or damage requiring repairs. Other hulls already in successful operation include deck barges, oil towing barges, derrick and pile driven barges. The trussweld method is especially applicable to ships carrying liquid cargoes in the hold and those carrying heavy deck loads.

The reverse channel type of construction is an arrangement of the channels so that they may be joined by direct welding, which makes for greater structural strength. Ships built on this plan are especially suited to carry dry cargo in the hold.

Some of the special advantages claimed for the truss-weld system are: Economy in cost through the elimination of rivets and heavy internal members. Saving of 10 to 25 per cent in weight of construction material. Extreme rigidity, eliminating to a great extent shearing stresses in operation. Ease of cleaning and preserving hull interiors, there being no place where dirt or rust may be trapped. Economy in repair of damage. Permanent tightness of hull, all seams being lapped and welded both inside and outside and by test actually showing to be the strongest part of the shell structure. Greater loads on shallower drafts with consequent saving in towing or driving power are claimed.



View of Truss-Weld Barge Built for O'Brien Bros. Sand & Gravel Co., New York, showing internal structure of angle iron members

S. S. Borinquen Completed]

(Continued from Page 19)

form eight subdivision compartments including the peak tanks. The collision bulkhead extends to the forecastle deck and is tied in to a water tight flat at the hurricane deck. The after peak bulkhead extends to the main deck. Machinery and boiler spaces are set off by bulkheads extending to above the top of the shade deck. All the super structure deck houses are built of steel.

On the main deck amidships there are accommodations for the crew, mess rooms, mail rooms, serving pantry, linen room, main galley, storeroom, toilets and washrooms, steward's cold storage room and cargo cold storage rooms. At the after end is arranged the second class pantry, storeroom, linen room, dining room, stateroom, toilets and steering engine room. In the forecastle head are waiters and crews quarters and hospital. The fore peak tank will be used for fuel oil and also as a salt water trimming tank. The after peak tank will be used as a salt water trimming tank and is also piped for fresh water. Double bottom tanks are used for fuel oil, water ballast and boiler feed.

Electric Deck Auxiliaries

Culinary water is carried in tanks built in aft of the engine room across the ship and at the after end of the boiler room port and starboard between the double bottoms and the lower deck. The vessel has one shaft tunnel for a single screw with tunnel recess and recess for stowage of spare tailshaft.

Electric cargo winches with cranes are fitted at all blind hatches on the main deck. Electric winches are also fitted on the hurricane and forecastle decks for working the forward cargo hatches.

The super structure including bridge enclosure contains staterooms, suites and special staterooms for first class passengers, vestibules, entrance and saloon lobbies, lounge and music room, library and writing room, smoking room, deck veranda and tea room, beverage room, private and public toilets and bath. Accommodations for second class passengers are arranged aft on main hurricane and promenade deck and include staterooms, toilets, baths, smoking room, lounge and music room; also dining room and pantry.

On the upper promenade deck forward of lounge and music room is the first class library, writing room, first class staterooms, port and starboard. Aft of the lounge and music room are located the smoking room, deck veranda and tea room, beverage room and deck pantry for first class. The forward house on the upper promenade deck is aranged for accommodation of the captain and deck officers.

The steel wheel, chart and wireless houses and navigating bridge are on the boat deck above. At the after end of the boat deck is a steel deck entrance house and a full height steel well over lounge and music room. Awnings are fitted over the forecastle.

All of the deck auxiliaries are electrically driven, including winches, capstans, windlass and steering gear.

The Borinquen is equipped with all the latest improved scientific navigational aids including the Sperry gyro compass. She has a powerful radio sending and receiving plant, and can be in constant communication with other ships at sea and with distant shore stations. For protection against fire there is a smoke detecting and automatic fire indicating system covering every part of the ship. Sprinkler systems, chemical and flooding system and other safeguards serve to protect all parts of the vessel.

Finest Decorations, Furnishings

No expense has been spared on the decorations and furnishings of the public rooms which are designed to give the impression of a large transatlantic liner. The passenger boarding the ship finds himself in the main entrance lobby on C deck. This room is paneled in polished full height panels of Honduras mahogany. The purser's office is located here. From the lobby rises the main stairway leading to all decks. Another stairway forward serves that part of the ship.

Above C deck is B deck which is given over entirely to staterooms and to the main promenade providing a complete circuit of the ship, wide enough to allow a row of deck chairs along each side with sufficient room for those who desire to promenade. Across the front and down each side for half the length of the ship the promenade is enclosed in heavy plate glass, so that the sea may be enjoyed in safety and comfort under all conditions. The next deck above designated as A deck serves as the center for social life on board. In addition to an open promenade surrounding the ship, this deck accommodates the larger rooms for gatherings in inclement weather, or after nightfall. The lounge, library, smoking room and deck veranda cafe are arranged in one group. Aft of the deck veranda cafe is an area of open space for deck games.

Social Life Centers in Lounge

The first class lounge is located centrally on the upper promenade deck. It is the most brilliant spot on the ship and is the public social center in which both formal and informal entertainments are held. The center of the room extends upward through two decks with a wide balcony at one end. It is really a grand hall, which with its parquetry floor offers an excellent ball room for dancing. Flood lights in colors are used. Along the

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S. S. President Coolidge

(Continued from Page 17)

rent turbine generator sets of high efficiency and light weight design. With the exception of the turbine driven boiler feed pumps and the main lubricating oil pumps, all of the auxiliaries are driven by electric motors furnished by Westinghouse. This includes CO2, brine, main condensate, fuel oil service, fire and sanitary pumps, compressors, forced draft fans. cargo and boat winches, warping and automobile capstans and steering gear. In addition to the 365 stateroom fans. there are 180 electric motors supplied by Westinghouse in the operation of this ship in sizes ranging from onetenth to those of the main drive of 13,250 horsepower. Electric heaters are fitted in staterooms and bathrooms. These heaters, involving some radical changes from similar heaters used in the home, were especially constructed by Westinghouse for marine service.

Safety has been given special attention in the design of the Dollar liners. All watertight compartment doors throughout the ship are to be electrically controlled direct from the bridge. In the event of accident of any kind all watertight doors throughout the ship can be closed within 15 to 30 seconds. Electrically operated boat davits are installed to insure the greatest possible safety in launching lifeboats. Lifeboat radios with automatic SOS machines will be a special feature. The generators on these sets may be driven either by a hand crank or by the special lightweight gasoline engines for this purpose. This lifeboat radio is fully automatic. If the engine is operating pressing the button starts the set which will send out SOS signals continuously with a range of from 500 to 2000 miles. No radio operator is needed nor is any adjustment. Merely by pressing the button every vessel within range equipped with radio will hear the distress signal and every vessel equipped with radio compass will be taking bearings.

The most modern navigating machinery will be fitted. The bridge equipment will include United States navy type compasses, Sperry gyro compass and other devices, radio direction finders, sonic depth finders, searchlights and many other aids to navigation will be used.

One of the features of this vessel will be a 100-car garage and a fully equipped machine shop to permit ordinary repairs and servicing of automobiles. Cars may be driven aboard through side ports.

The United States coast guard will hold a competitive examination for appointment of cadets June 17 to 19. Young men between 18 and 22, who are of the required moral character and who have completed the equivalent of a four-year high school course, are eligible to take the exam.

Committee Will Consider Shipping Problems

During the Third National Conference on the Merchant Marine held in Washington in 1930, there was advanced the necessity for providing means whereby a common meeting ground could be provided for shipper, shipowners and underwriters for the better understanding of marine insurance questions, as a medium for the use of shippers, shipowners and underwriters who might have misunderstandings difficult of solution between themselves and to provide an opportunity for shippers to be heard in all matters of mutual interest.

A committee to be known as a Permanent Public Committee for the Consideration of Marine Insurance and Shipping Problems has been appointed and has been organized as follows: Representing the public-Hon. E. C. Plummer, commissioner United States shipping board, Washington, chairman; Laurens N. Prior, bureau of navigation, department of commerce, secretary; A. Lane Critcher, bureau of foreign and domestic commerce, department of commerce. Representing the vessel owners-H. B. Walker, president American Steamship Owner's association; J. D. Tomlinson, vice president American-Hawaiian Steamship Co. Representing the underwriters-W. R. Hedge, president Boston Insurance Co., Boston; Wm. D. Winter, vice president of the Atlantic Mutual Insurance Co., New York.

The discussions of the Marine Insurance committee appointed by the second national conference on the merchant marine developed the fact that there was no organization through which various interests could discuss their mutual insurance problems. It is confidently expected that this permanent public committee will be able to bring about a better appreciation of the problems confronting shippers, shipowners and underwriters.

The committee's services will be available in those cases where difficulties have arisen between two parties and where on request, the committee will endeavor to find common grounds for agreement. It will also endeavor to formulate and have adopted general policies of procedure, fair and equitable, to all parties in transactions pertaining to shipments.

Canal Traffic Lower

Total number of commercial vessels transiting the Panama Canal during the calendar year ended December 31, 1930, aggregated 5885 and the total tolls collection was \$26,146,024. The number of transits declined 545, or 8.5 per cent, in comparison with the calendar year 1929, while tolls collections decreased \$1,446,690, or 5.2 per cent.

The lower percentage of decrease in tolls in comparison with the decrease in number of transits was caused by the greater average tonnage of vessels transiting in 1930. The month of the greatest traffic in 1930 was January with 531 transits and \$2,360,211 in tolls while September contributed the lowest, with 458 transits and \$2,057,103 in tolls. The decrease in canal traffic was attributed to the existing world wide adverse business conditions.

Daily average number of commercial transits during the year was 16.12, as compared with 17.62 in the calendar year 1929, and 17.31 for the calendar year 1928. The daily average tolls collection in 1930 amounted to \$71,632 as compared with \$75,596 in the calendar year 1929 and \$72,065 in 1928.

J. H. Clark, Great Lakes district manager of the Oertz Rudder Co., recently assumed the handling of marine sales on the Great Lakes of the Hoffman Firite automatic stokers, manufactured by the Hoffman Combustion Engineering Co., Detroit. He will in future represent both interests in the Great Lakes field.

The tank top of the 10,000-ton steamer Joliet is being reconstructed at the yard of the Interlake Engineering Co., Cleveland, the work being done under the channel steel system for tank tops, side tanks and bulkheads. Similar work is also under way on the 11,000-ton steamer Michigan at the plant of the Cleveland Stevedore Co., Huron, O. The work on both of these ships is being supervised by the Channel Steel Hull Corp., Cleveland.

Grace Line Merges Four Steamship Services

Announcement was made on Jan. 29 by officials of the Grace Steamship Co. of the merging into one system of the four steamship services controlled by the Grace interests and operating between the Eastern and Western seaboards of the United States, the Central American republics and the West Coast of South America. Decision to merge these systems was coincident with the signing of the contract with the shipping board for the construction of four 19knot passenger and cargo vessels by the Federal Shipbuilding & Dry Dock Co. at a cost of about \$17,000,000. Of this amount 75 per cent will be covered by a loan from the shipping board. The services that have been merged with the parent company are the Grace Line North Pacific division, the Panama Mail Steamship Co. and the New Orleans & South American Steamship Co. (Nosa line).

The new ships are to be operated in the Panama Mail line service and will be ready late in 1932.

S. S. Borinquen Completed

(Continued from Page 56)

sides of the dancing floor are a number of attractive alcoves furnished with easy chairs and little tables for those who wish to sit out. The lounge is decorated with attractive hangings of bright colors framing the steel casement sashes. Large crystal glass windows provide many views of the sea and of the lounge from the promenade deck outside. The lighting is of the semi-indirect type with attractive wall brackets giving a soft and diffused light augmented by a sunburst chandelier in the center of the ballroom for use when brilliant effects are desired. Ventilation and heating of this space has been given the most careful consideration so that the temperature may be comfortable and even at all times regardless of weather conditions, with abundance of fresh air without drafts.

The dining salon, attractively decorated is located on the main deck directly forward from the lobby and purser's office. Entrances are provided on either side and the service has been arranged so that there is no delay or sense of confusion when all the tables are occupied.

The smoking room is designed in the old English manner and is done in panels of oak with the floor resembling slabs of slate in multicolored hues. Alcove tables are provided for card playing and there is a log fire at one end of the room. The chairs and divans are covered with Turkish red hand crushed leather or old English tapestry. Windows are arranged in groups and are glazed with hammered glass.

Aft of the smoking room is the deck veranda and cafe. Low sill casements on all sides give an excellent view of the promenade and of the sea at the stern of the vessel. This room is decorated in the Spanish Provencal style.

Safety with Comfort Paramount

Forward of the first class lounge are two alcove rooms, one on the port side and the other on the starboard side. The former is the writing room and the latter the library. Both rooms are attractively decorated and afford quiet and privacy.

While the safety and comfort of passengers have been paramount consideration on the part of the Porto Rico line in building the Borinquen, the needs of the shipper have been given special attention. As mentioned above the finest facilities are provided for transporting perishable cargoes such as fruits and vegetables.

Other steamers in the fleet of the New York and Porto Rico line are the Coamo, San Lorenzo, San Juan and Ponce. These vessels are all engaged in the New York, San Juan and Santo Domingo run.

The National Publication Covering the Business of Transportation by Water

March, 1931

Strength and Durability Illustrated

A 2000 ton drydock section was towed from New York to the Todd Shipyards Corporation's New Orleans Dock-a distance of 1800 miles. During the journey, heavy weather was encountered, making the tow more difficult.

The Columbian Towing line gave perfect service and although the tug and tow were a little behind schedule, the tow was brought in safely.

Columbian Tow-Ro was built for this and any other types of towing. It may also be used as a spring line. Its qualifications are:-

Tow-Ro is a new, patented construction.
It possesses super-strength and durability.
It is guaranteed.

It is waterproofed.
It is flexible without distortion and remains flexible, wet or dry.

It may be easily spliced. It is readily identified by its red, white, blue, white and red surface markers.

For your toughest job, try Columbian Tow-Ro Pure Manila.

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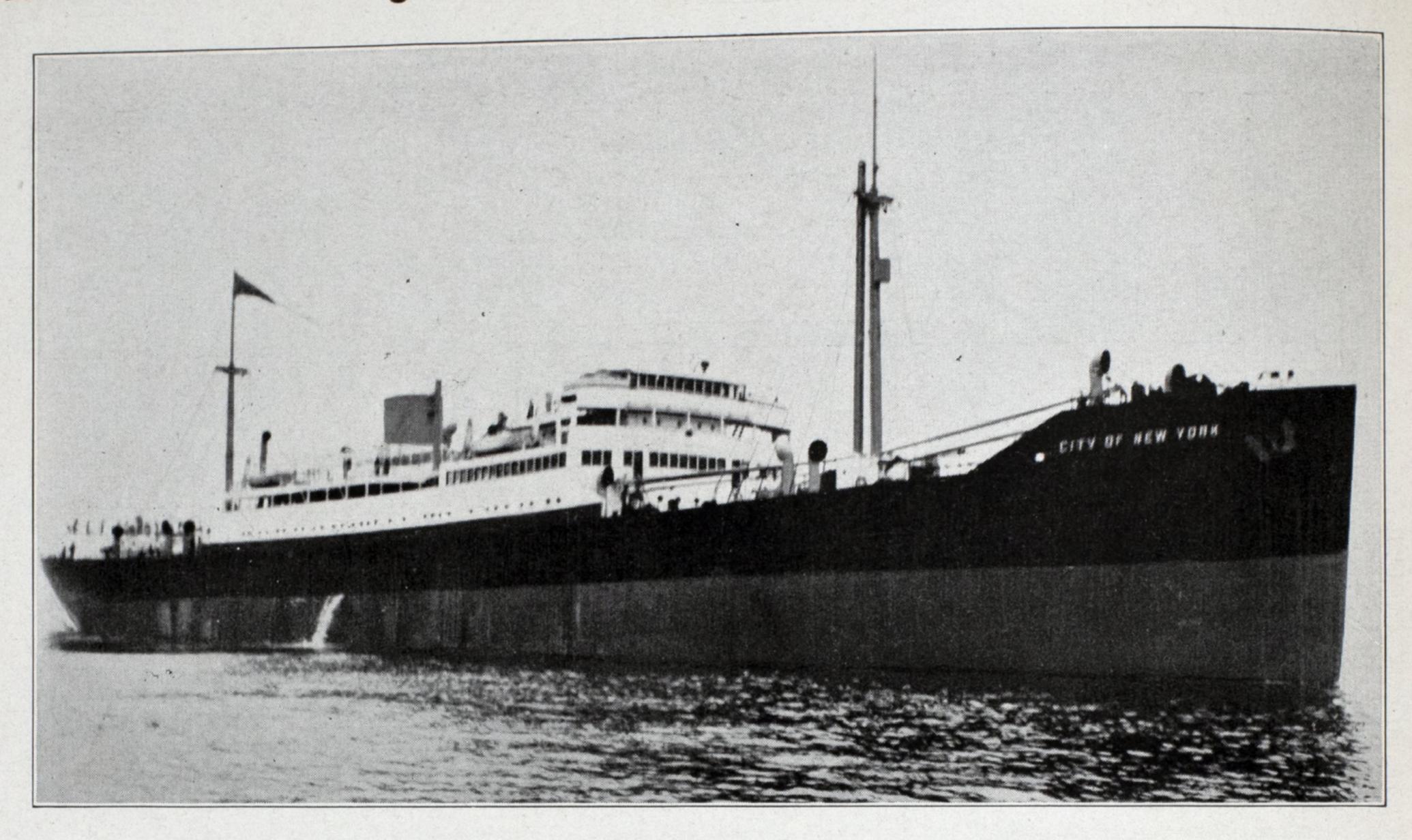
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(Passenger and Cargo)	h.p.	d.w.t.		h.p.	d.w.t.
Benson Ford	3,000	12,000	Aurora	3,000	10,200
Challenger	3,000	11,600	Australian (twin screw)	5,000	17,120
City of New York			Bidwell	3,000	10,200
(twin screw)	5,400	9,350	Chester Sun	2,800	13,452
East Indian (twin screw)	5,000	11,600	Eastern Sun	3,000	13,500
Henry Ford II	3,300	12,000	Gulf of Venezuela	3,000	10,200
Twin Screw Yacht Sialia	1,500		Pacific Sun	3,000	13,500
			Sun	3,000	13,500
			Sunoil	3,000	13,500
			Tide Water	3,000	13,800
			Tide Water Associated	3,000	13,800
			Western Sun	3,000	13,500

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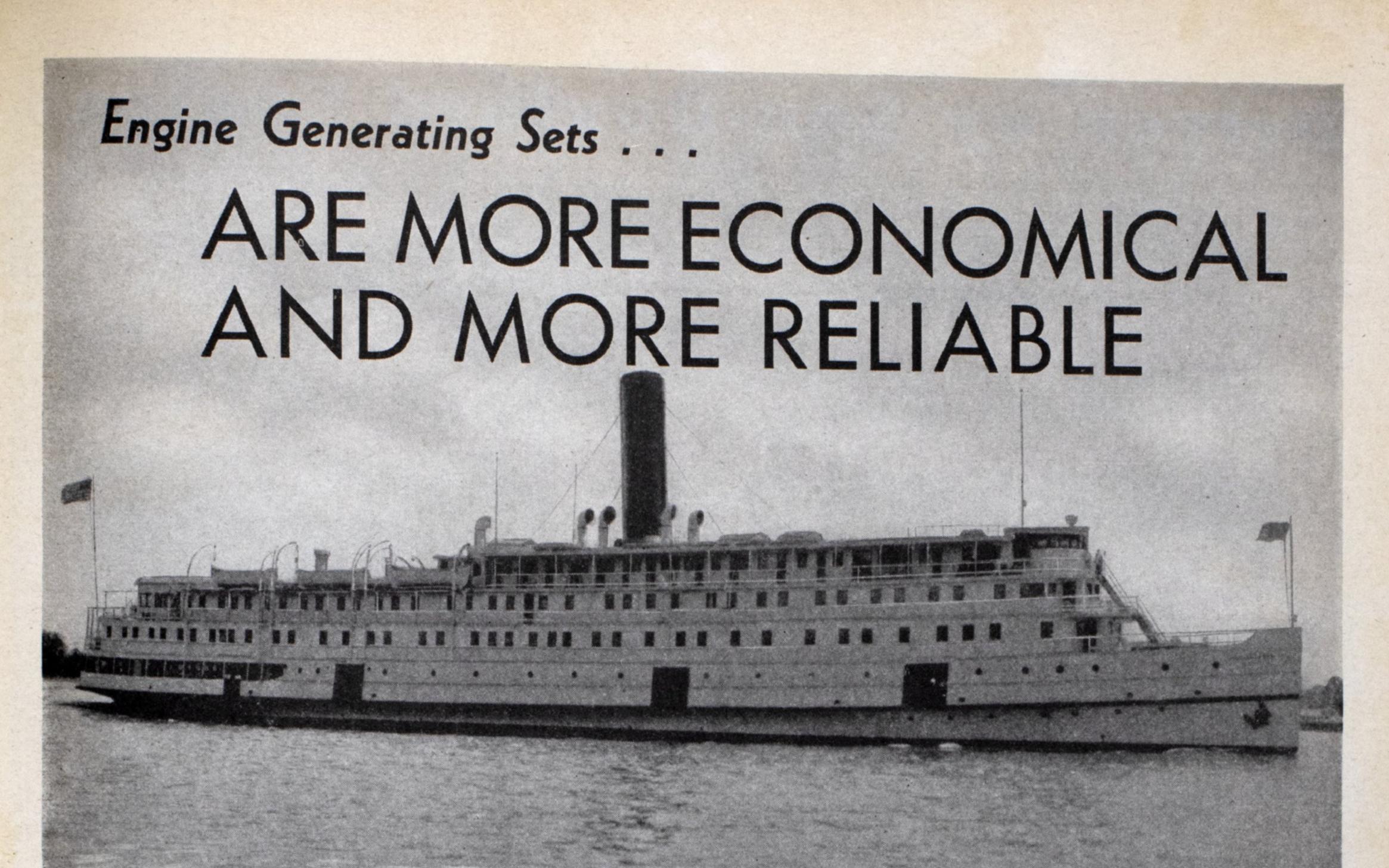


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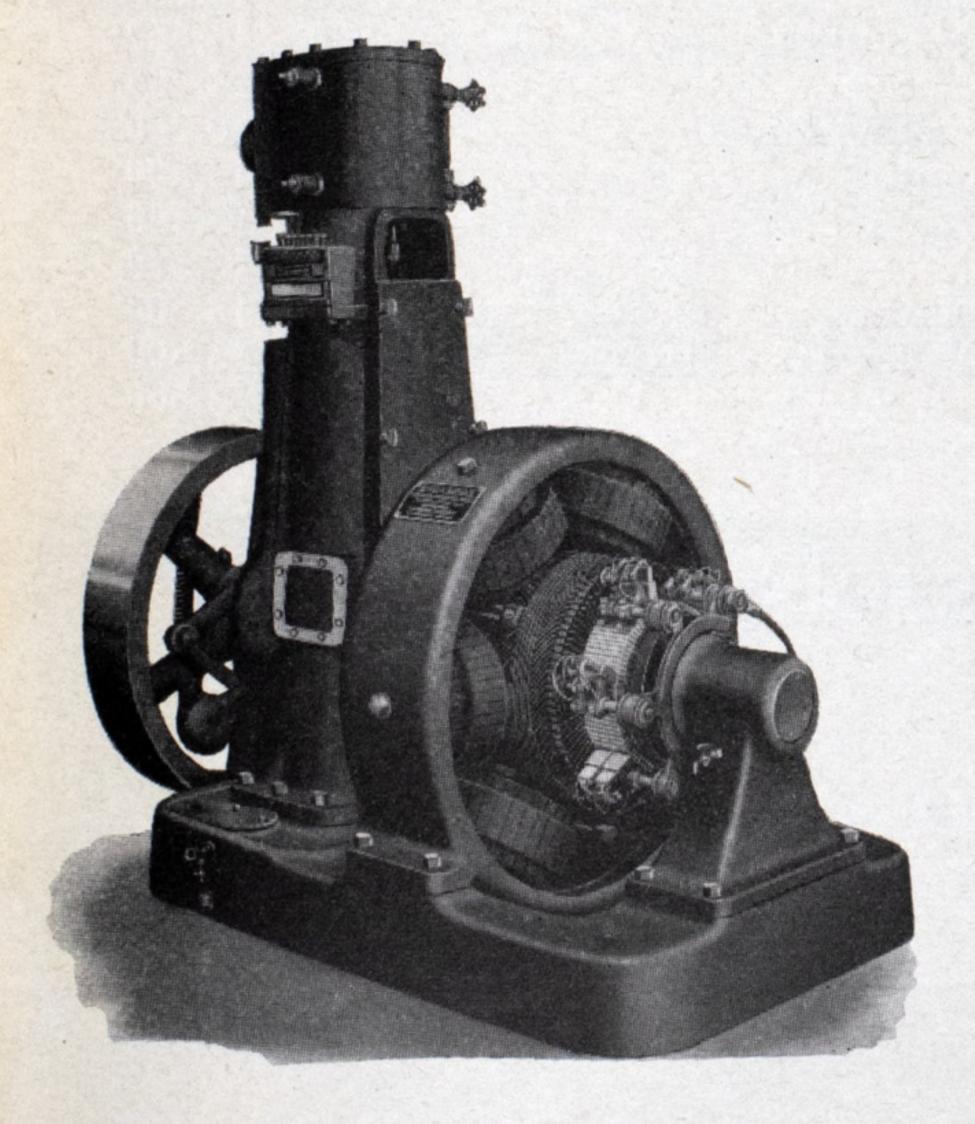
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Constant voltage is assured by excellent speed regulation. The governor is simple, positive and unusually reliable.

No elaborate warming up is necessary. This saves time and eliminates damage caused in other types of steam drive from rapid, unequal expansion.

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MARINE GENERATING SETS AND ENGINES

Pay for themselves by low cost dependable operation

Experienced marine engineers look to scientific lubrication to keep their engines running smoothly and economically. The Vacuum Oil Company has pioneered in scientific lubrication since 1866. For example, throughout the seven seas—

65% of the

world's Diesel-driven ships are correctly lubricated with Gargoyle Marine Oils—

QUALITY BRINGS LEADERSHIP

SIXTY-FOUR years of specialization have Siven us a knowledge of how to deal with exacting lubrication needs which is probably unapproached by any other organization in the world.

Our staff of lubrication engineers is continually studying different types of marine engines. When new designs and greater efficiency call for lubrication changes, they recommend the correct oil and its proper application.

Gargoyle Marine Oils are sold in more than 300 of the world's leading ports. In every one of these an experienced Vacuum Oil Company representative is ready at all times to confer with you on your own particular lubricating problems.

NOTE: We will be glad to send you, without obligation, either of our authoritative treatises—"Steamships with Reciprocating Engines" and "Marine Lubrication—Motorships." Address your request to: Vacuum Oil Company, Marine Sales Dept. D-3, 61 Broadway, New York City.

VACUUM OIL COMPANY

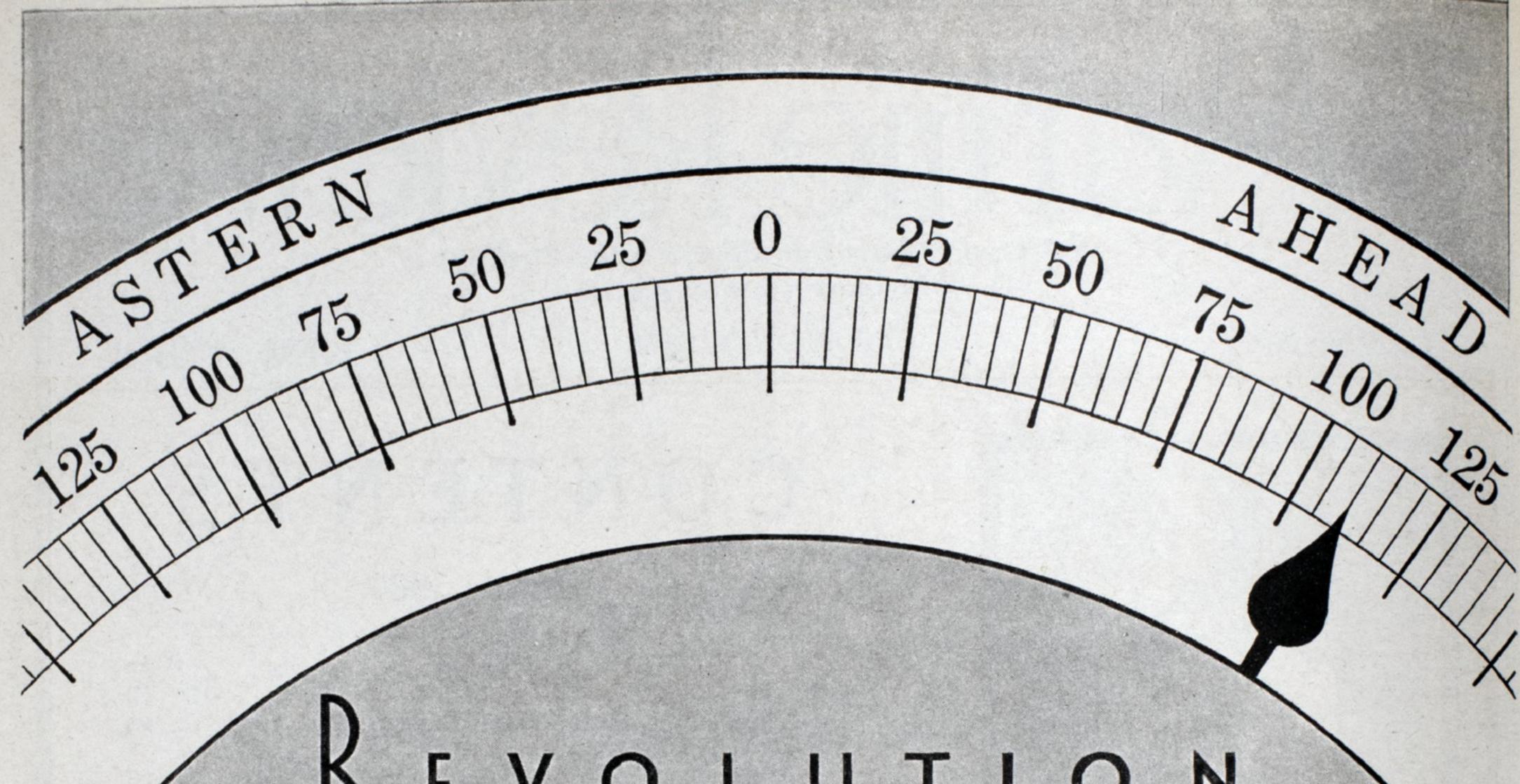
Specialists in the manufacture of high-grade lubricants for every class of machinery. Obtainable everywhere in the world.



Marine Oils

A grade for every type of service





REVOLUTION INDICATOR SYSTEM

The Sperry Revolution Indicator System provides a direct reading indication of the revolutions per minute of a vessel's propellers, and the total number of revolutions logged. It has been perfected after many years of research and experience in the field under actual service conditions. Much credit is due to steamship operators for their valuable suggestions, many of which have been incorporated in this instrument.

Ease of installation and maintenance has been given primary consideration and only four conductors are required between a transmitter and an indicator. Either 110 volt or 220 volt ship's supply is required and a signal light may be readily connected for flashing revolutions in a remote location.

We will appreciate the privilege of sending a new illustrated booklet describing this apparatus in detail.

7 3 1 1 8 5 6 0



SPERRY GYROSCOPE CO., Inc.
BROOKLYN - NEW YORK

· Have American Ship make your Alterations

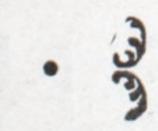


Five modernly equipped ship yards are ready to give you swift, economical, dependable service on any size job—now!

Remember that, now, materials cost less and labor is

The AMERICAN SHIP BUILDING CO.

more efficient.



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TIRELESS STEVEDORES

Just throw the switch—and tireless stevedores attack the cargo of the all-electric ship. • Winches, powered by G-E motors and guided by G-E

controllers, swing giant bundles between hold and dock. No waiting, no dissipation of unused power; just efficient methods applied to loading and unloading. • For the power plant of the ship has energy to spare. It feeds auxiliaries above deck, below deck, from pilot house to galley. In truth, electricity is vital to the operation of the modern vessel. • General Electric has designed and built electric equipment for ships which range from tugs to ocean liners. Its engineering experience and extensive facili-

ties for manufacture and service are always available to a progressive maritime industry.

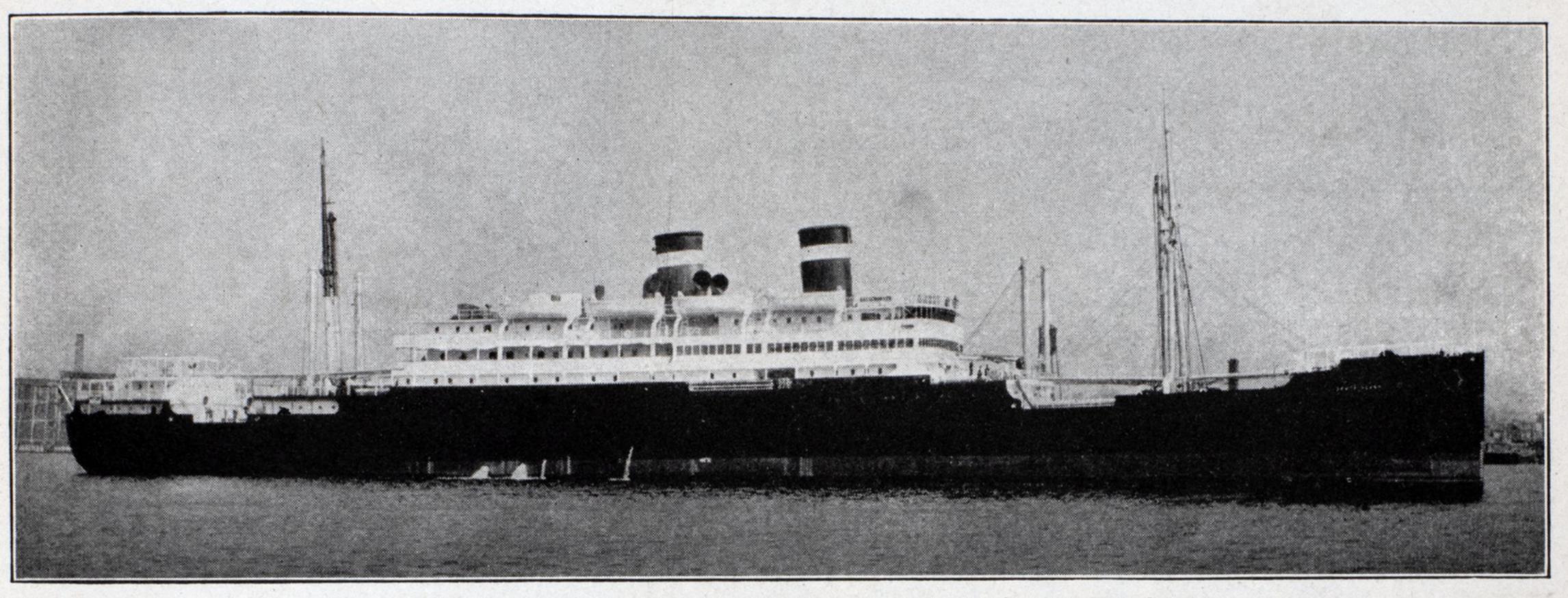
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BROADCAST EVERY SATURDAY EVENING ON A

NATION-WIDE N.B.C. NETWORK



Make revenue flow into American channels



S. S. "Santa Clara." Delivered April 1st, 1930. Built by New York Ship-building Company for the Grace Line. A fast, modern and luxurious American-built ship equal to any foreign vessel of her type and size afloat.

HEN a person residing in the United States takes a foreign ship in making a trip abroad, he is sending his passage money outside of the United States just as surely as if he put it in an envelope and mailed it to a foreign country for the purchase of goods.

This is exactly what some 70 percent of the American citizens do when they determine to travel abroad and it is exactly what about 65 percent of

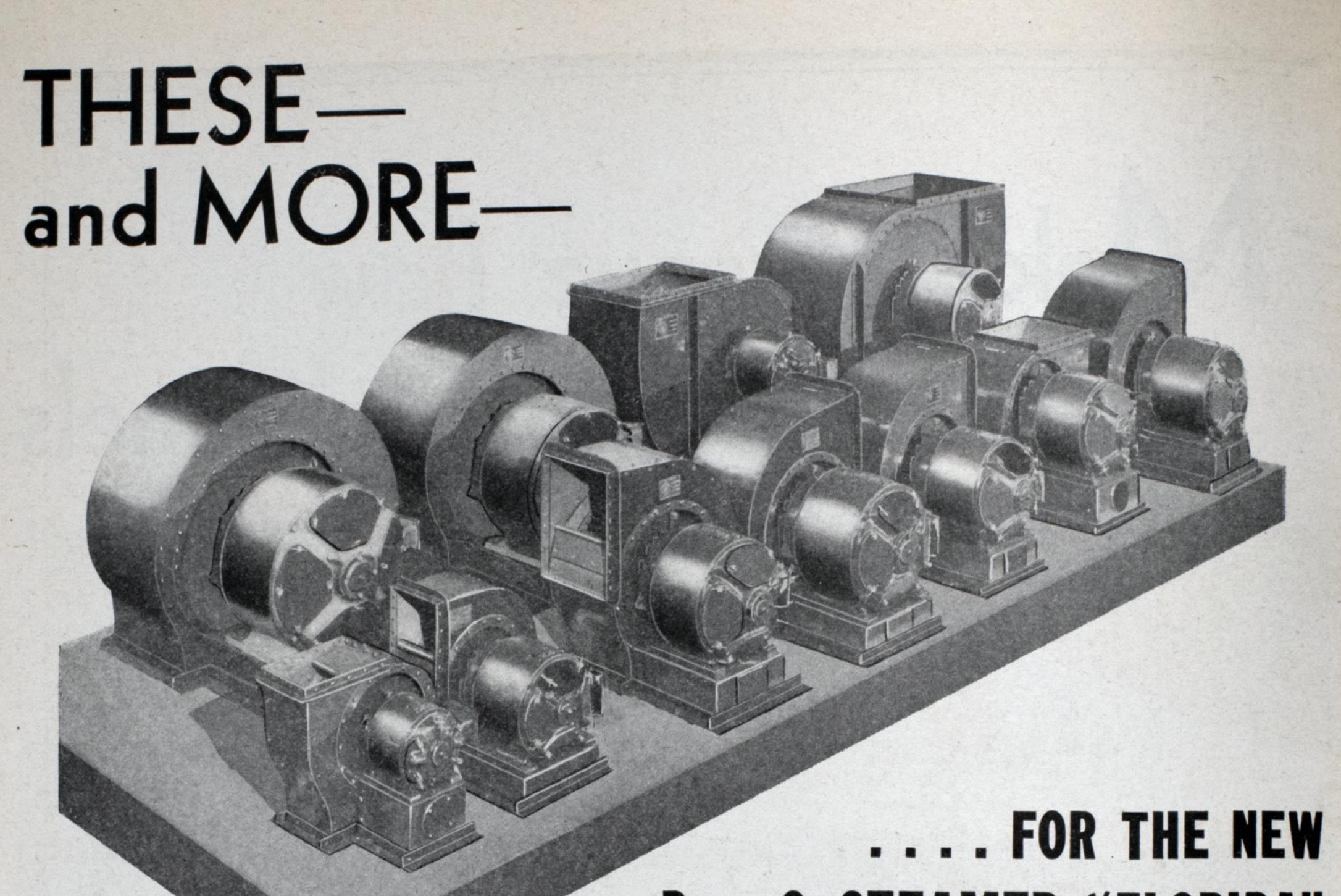
our people do when they decide to ship goods to foreign countries.

A change in this policy can be made without cost and without effort. Passenger fares by international agreement are class for class, speed for speed, accommodations for accommodations the same. This is also true of freight rates. There is no advantage at any point in shipping freight on a foreign vessel as against an American vessel.

Keep your Money at Home

NEW YORK SHIPBUILDING COMPANY

Main Office and Works: CAMDEN, N. J. New York Office: 420 LEXINGTON AVE.



P. and O. STEAMER "FLORIDA"

When completed this modern passenger steamer now building at Newport News Dry Dock will be almost 100% Diehl motor equipped.

The above illustration shows partial shipment of the ventilating blowers, equipped with Diehl marine type, weatherproof, ball-bearing motors. In addition the installation will include Diehl motors for elevators, machine shop apparatus, galley appliances, pumps, compressors, oil purifiers, etc. and complete fan equipment for staterooms.

The selection of Diehl motors by many American shipbuilders and operators to aid them in carrying out their program of enhanced comfort for ship passengers, testifies to the quality and dependability of Diehl power apparatus.

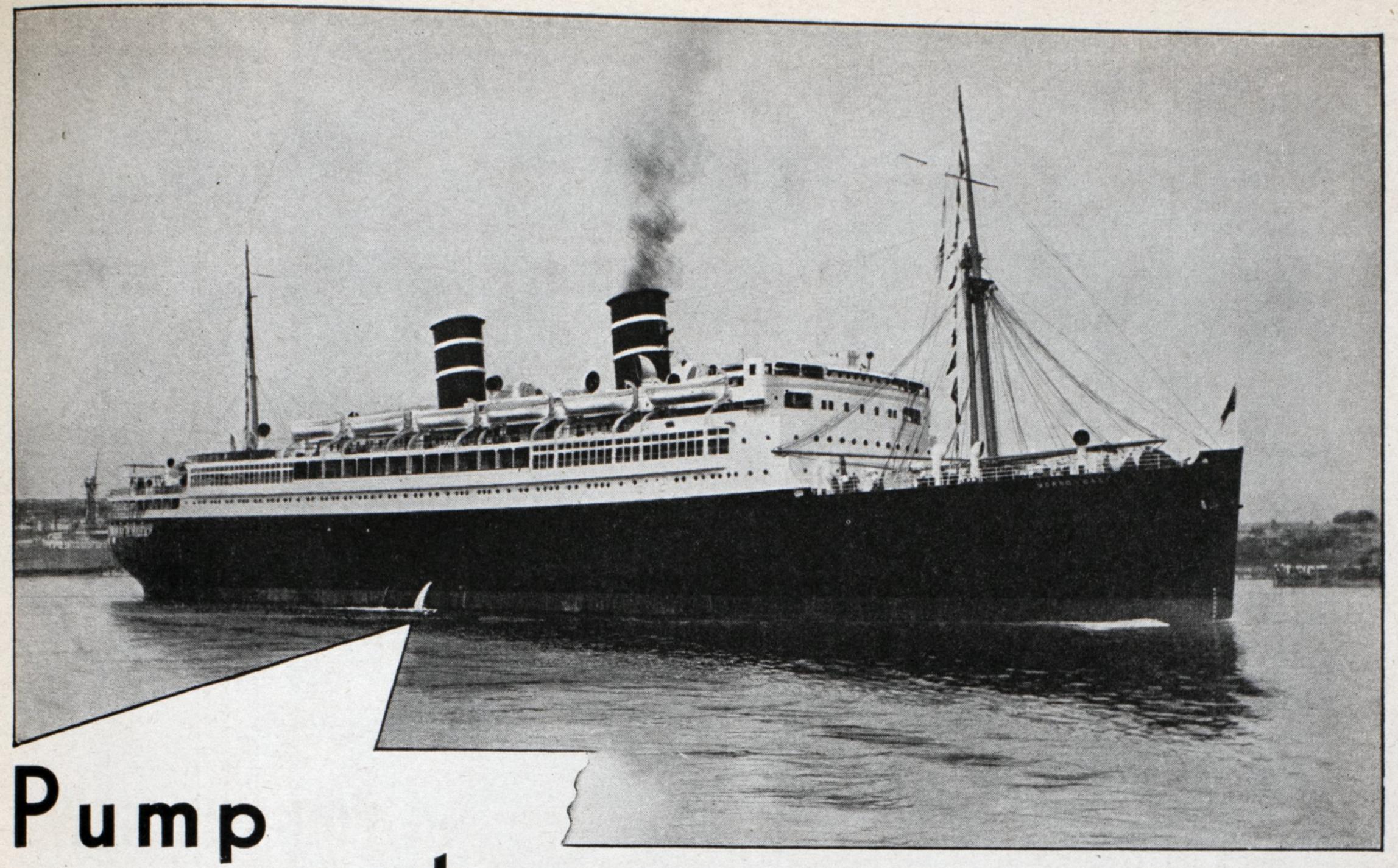
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Electrical Division of THE SINGER MANUFACTURING CO.

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Atlanta - Boston - Chicago - New York - Philadelphia

DIEHI



out bilges and ballast IN PORT without danger of oil pollution

Avoid infringement of port regulations when pumping out bilges and ballast tanks by using the Bethlehem L J Oil Separator.

It is simple in construction and has no working parts that have to be repaired or renewed. It occupies small space, is easy to operate, and can be installed in any vessel conveniently and at low cost.

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Machine shop at Rivard Street, Detroit where we build and repair engines

HIGHEST STANDARDS

of workmanship, engineering and service are ever apparent in Great Lakes built ships and engines—and repairs.

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"Clarkat"—38½" wide, 78" long, 51" turning radius, 2000-lb. max. drawbar pull, ½ to 7½ mi. per hr. Clark Steel Trailers—3' x 6'. Cap. 4000 lbs., 54 cu. ft.

Turns in a box car "CLARKAT" TRUCTRACTOR

Minutes saved mean dollars earned. The "Clarkat" multiplies man power—enables your huskies to do more work, more easily, in less time. The transportation world's smallest, most active tractor for pushing and pulling trailers.

Whisks a train of freight-laden trailers along warehouse aisles, through narrow doorways, up ramps, spots them where they're wanted, driver uncouples without dismounting, pivots on one rear wheel and speeds back to the wharf for another train while the first is being unloaded. An agile, nimble tractor that turns around easily in a box car—any man who drives a car will be at home with its controls.

The "Clarkat" is cutting cargo handling costs in railway and steamship terminals. We can tell you of some interesting installations.

The Clark Tructractor Co.

Battle Creek, Mich.

Attach this
ADVERTISEMENT
to your inquiry

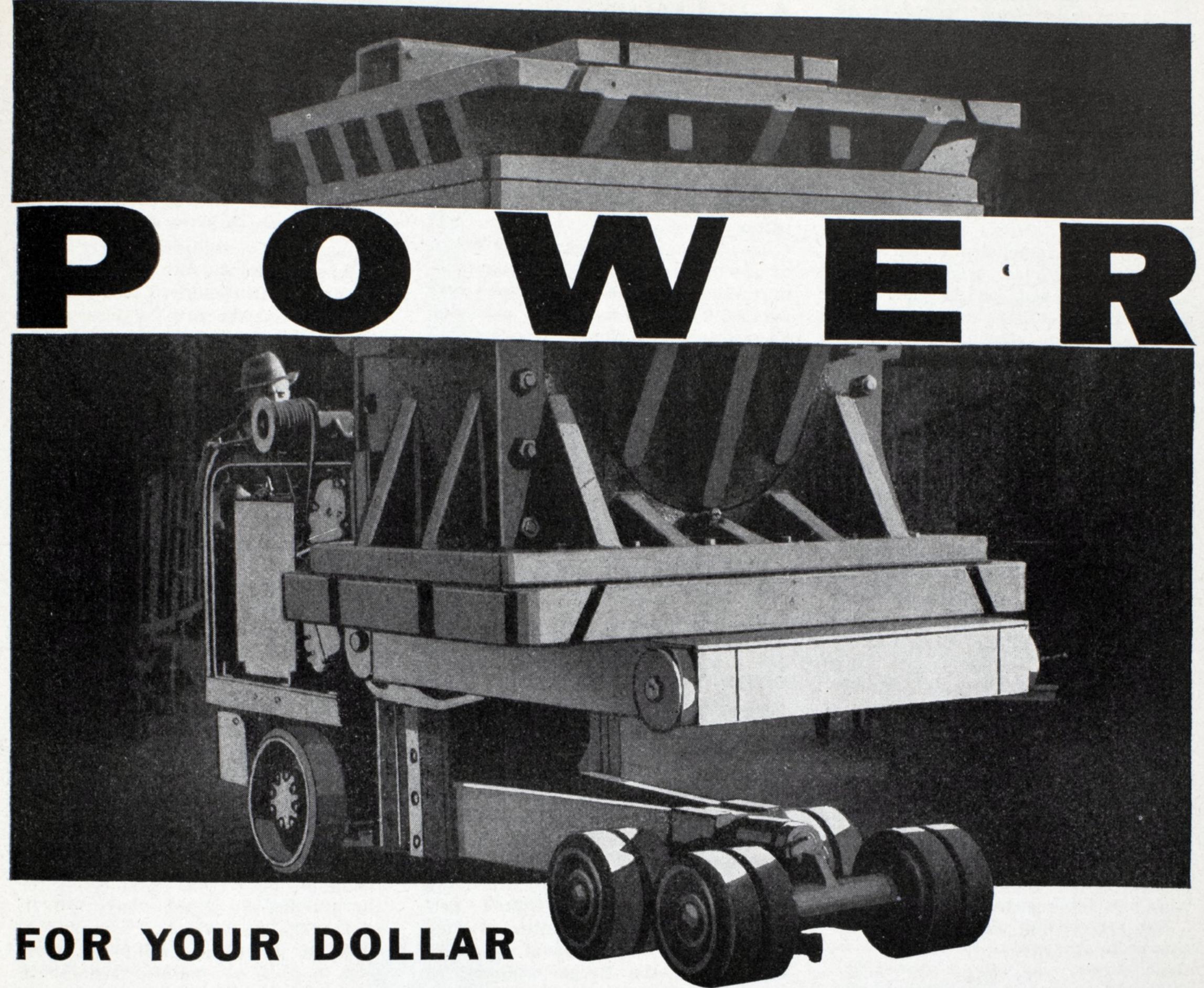
Special Note!

Clark vehicles are gas-powered—
therefore competent for 24 hour
continuous service and just as
potent the last hour as the first.

Clark 24-hr. continuous service

Ordinary Salas amaias

ELWELL-PARKER GIVES YOU EXTRA



When you look beneath the steel plates—inside the housings of an Elwell-Parker Electric Truck, you see many reasons why it delivers extra power to the pay-load.

In the two motors, one to drive and one to lift, you notice extra heavy copper coils. Unusually large armatures. Forged field rings. The drive motor carries eight brushes. Power failure at crucial moments is impossible because there are no fuses anywhere on an Elwell-Parker. The motors are sufficiently heavy in copper to absorb all the power that can be delivered to them. On occasion, this may be five times normal demands.

Accurate machining contributes to the high efficiency of the truck. Some parts of the motors are held to within .0003 of an inch. So are the wheel bearings and differential cage bearings. Without exception, all shafts turn on ball or roller bearings. And every one is either grease packed or pressure lubricated.

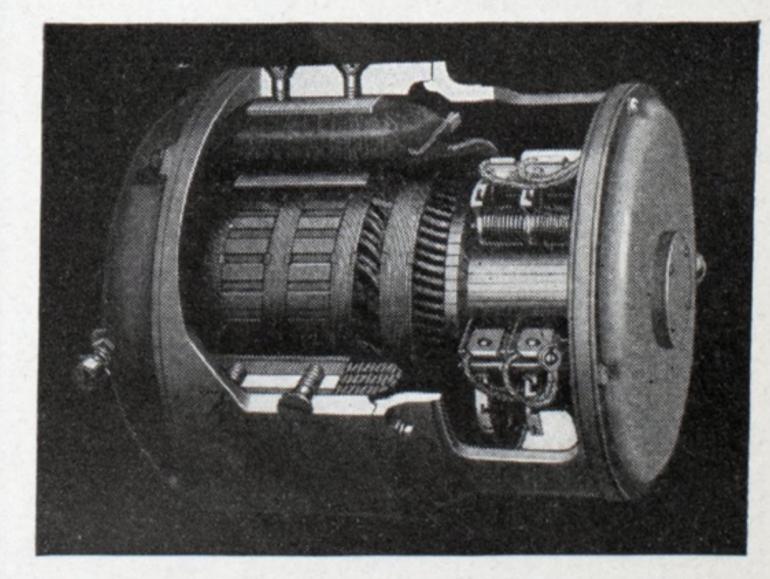
Some idea of the tremendous power generated and transmitted to the

Write for this New Booklet. Tremendous savings are being made by handling materials on skids with Elwell-Parker Electric Trucks. The advantages, types of materials handled, and methods used are pictured and explained in a new booklet, "Handling and Shipping on Skids." It will be sent without charge or obligation to interested executives. Write The Elwell-Parker Electric Company, 4200 St. Clair Avenue, Cleveland.

ELWELL-PARKER

DESIGNERS AND BUILDERS OF ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND CRANES FOR OVER A QUARTER CENTURY wheels may be gained from the fact that drive axles must be built to withstand a torque of 150,000 pound inches.

From these facts, it is easy to see why the Elwell-Parker carries bigger loads, climbs steeper ramps and gives you more power for the dollar you invest in electric trucks.



Motors are designed and built by Elwell-Parker solely for use in Elwell-Parker Electric Trucks. Operating characteristics can thus be completely controlled to meet the enormous power demands of electric trucking.

by this company

"One Exide-Ironclad Battery, one truck and one man, saved \$7,000 in a 14-day period."

Exide-Ironclad cell cut away to show unique construction.



CARNATION COMPANY

OCONOMOWOD

'FROM CONTENTED COWS"

CABLE ADDRESS: CARNATION

SEATTLE

IN REPLY PLEASE REFER TO W. H. Brooks

OCONOMOWOO. WINCONNIN Can Factory. Nov. 3, 1930.

NEW YORK

Mr. Harry J. Olson. 5118 Plankington Bldg. . Milwaukee, Wisconsin.

Dear Sir:-

You may be interested in knowing about the performance of our 15 cell, 19 plate Exide Ironclad battery, purchased nearly two years ago with an Elwell Parker fork type tiering truck, for handling unboxed tinplate on skids.

When the railroads running between Chicago and Milwaukee appealed to the Interstate Commerce Commission to approve a 25% lower rate on steel, to better enable them to meet water competition, the I.C.C. recommended a 50% increase and finally made it stick. As the increase went into effect on very short notice, during the peak of our busy season, we would either be compelled to pay it or store considerable tinplate in a short time, which course we chose. All told some 6.000 tons were handled in three weeks.

97 carloads, totaling some 4,000 tons, were handled in a 14 day period; in which were 3 Saturdays, and this was handled by one Exide Ironclad battery, one truck and one man. No demurrage arose and the freight increase saved was nearly \$7,000.00. Average haul was 75 to 90 feet and average height of tiers 3 feet.

This battery has been inspected since by two different inspectors, who could not possibly have known of the performance cited, and we were recently commended on the good electrical and physical condition of all the cells.

We never even dreamed that a truck and battery had the hidden possibilities that we found. Machinery is dragged around the plant on ends of skids, without rollers or crowbars, jacks or dollies. Motors are taken down, cleaned and replaced by the high lift tructor. Je recently loaded 3 carloads of machinery boxed for export, in 1/10 the time hand labor could do it. One box was 1" narrower than the car width, but slid in place when "Big Bertha" pushed.

It is not generally known, but nevertheless true, that when Exides come in, ruptures go out. Not only the medical kind, according to our records, but also the economic kind, also according to our records.

We are pleased to give you credit for results.

WHB: CMB

Yours truly, WHO Inolly

WHAT OTHERS SAY ABOUT EXIDE IRONCLAD

DEAD the letter on this page. See what it says about the I phenomenal savings made possible by an electric industrial truck equipped with Exide-Ironclad Battery. No matter what your business, you too can save.

Industrial trucks equipped with Exide-Ironclads are dependable . . . have a long life . . . yes, and they save time, money and release men for more productive work. Material-handling costs with Exide-Ironclads on the job are astoundingly low. Not in theory, but in practice. Exides finish up the day just as strong and snappy as they start it . . . full of pep all the way.

How can Exide-Ironclads do all these things? They're built that way. The slotted rubber tubes in the positive plates retain the active material and make Exide-Ironclad the different battery ... the money-saver that it is.

Investigate before you buy ... write for booklet, "Facts for consideration in selecting a Storage Battery." No obligation. Act today.

STORAGE BATTERY COMPANY, Philadelphia THE ELECTRIC

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto

OIL OUT OIL OUT Z CONDENSATE A single pass Coen Heater is furnished in two sizes . . . Patented. No. 1,455,164.

The three pass Heater is built in one size only. Patented. No. 1,573,223.

←STEAM IN

.. for efficient heating.

COEN OIL HEATERS

Designed without coils, tubes or inside joints, Coen Steel Oil Heaters have the added feature of cleanability. While hundreds of them have been operated for years without the necessity for cleaning arising, they can however be taken apart and the heating surface scraped.

They are furnished in two types, and may be used individually or hooked in multiple, depending upon the quantity and viscosity of the oil to be handled.

The single pass heater is built in two sizes, the 7"x40" and the 12"x50". The three pass heater is constructed in one size only with an O. D. of 13" and a length of 54".

Coen Heaters have an unusually large capacity for the overall area of the unit. A single unit will handle per hour the following amount of fluid: With Oil in at 90° and Oil out at 200° and steam pressure of 100 lbs., the 7"x40" will clear 700 lbs., the 12"x50" - 1,400 lbs., while the 13"x54" will handle 5,000 lbs. The capacity will naturally vary according to oil temper-

vary according to oil temperatures and steam pressures.
All Heaters are tested to 500 lbs. hydrostatic pressure before leaving the factory.

Write for Bulletin 15 giving full details.

COMPANY INC. COMBUSTION ENGINEERS

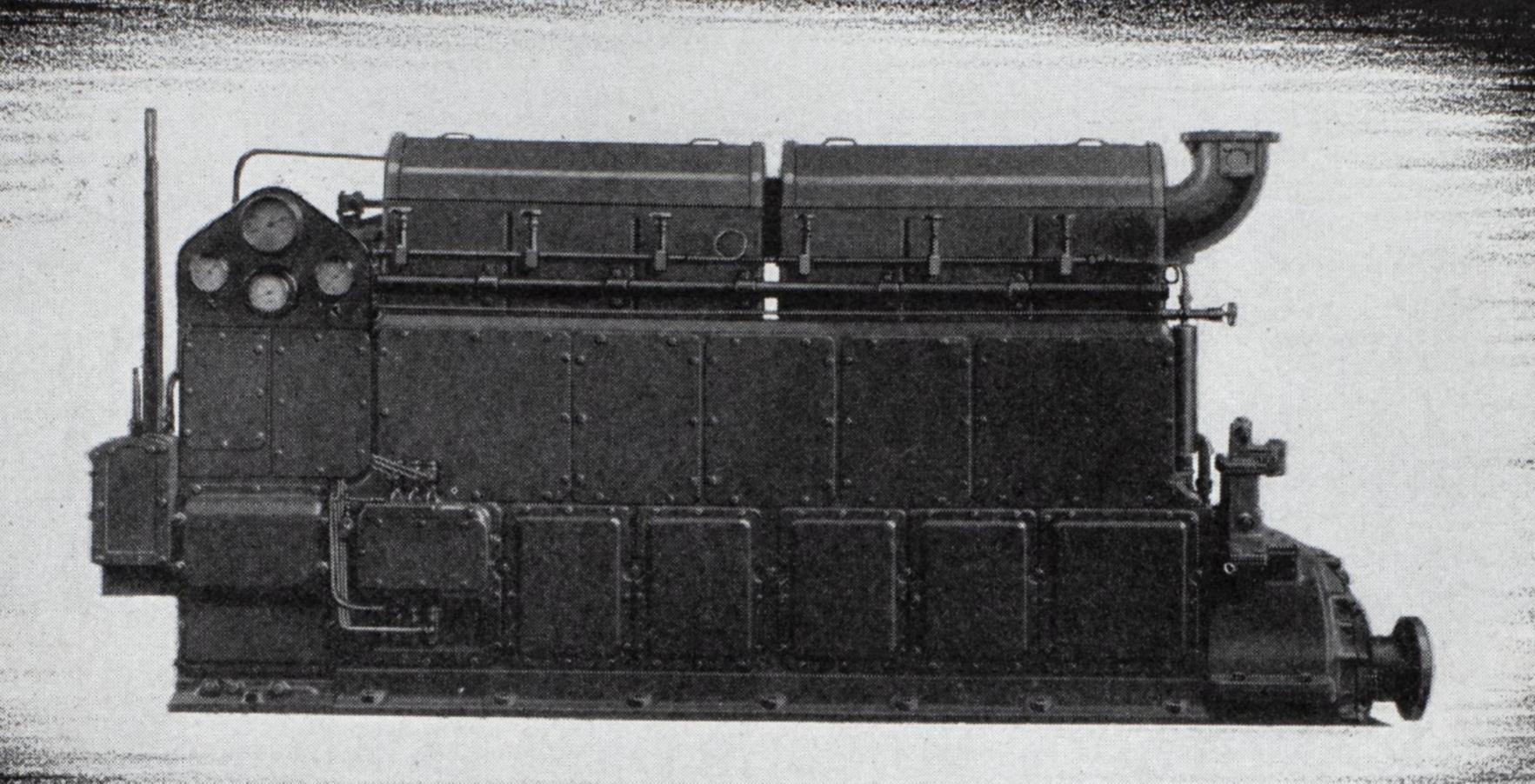
Manufacturers of Fuel Burning Systems

610 SOUTH BROADWAY, LOS ANGELES, CALIF.
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SAN FRANCISCO HOUSTON

50 Church Street NEW YORK

NEW Cooper-Bessemer Marine Diesel Engines Improved To Operate Simpler And Better



New Cooper-Bessemer Direct Reversible 6 and 8 Cylinder Marine Diesel Engine. This type built from 150 to 400 H.P. Other types built from 35 to 1500 H.P.

HAVE you seen the new model Cooper-Bessemer marine diesel engines? These engines with their important improvements, are winning the favor of naval architects, marine engineers, owners and operators. They combine the superior design and workmanship of former models, with many changes which give simpler and better operation.

LEADING IMPROVEMENTS

Completely Self-Lubricated — No hand oiling is necessary on any part of the engine.

Important Parts Duplicated — Possibility of shut-down is practically eliminated by providing duplicate built-in pumps.

Large Diameter Crankshaft — Crankshafts stand up under severe operation.

Dangerous criticals within operating range eliminated.

Special Material Valves — Sturdy, special material valves give long, trouble-free service.

Only Semi-Steel Castings — Greater strength and less weight are the results of using semi-steel for major castings.

Improved Piston Operation — Full floating wrist pins decrease bearing pressure by increasing bearing area on both wrist and crank pins.

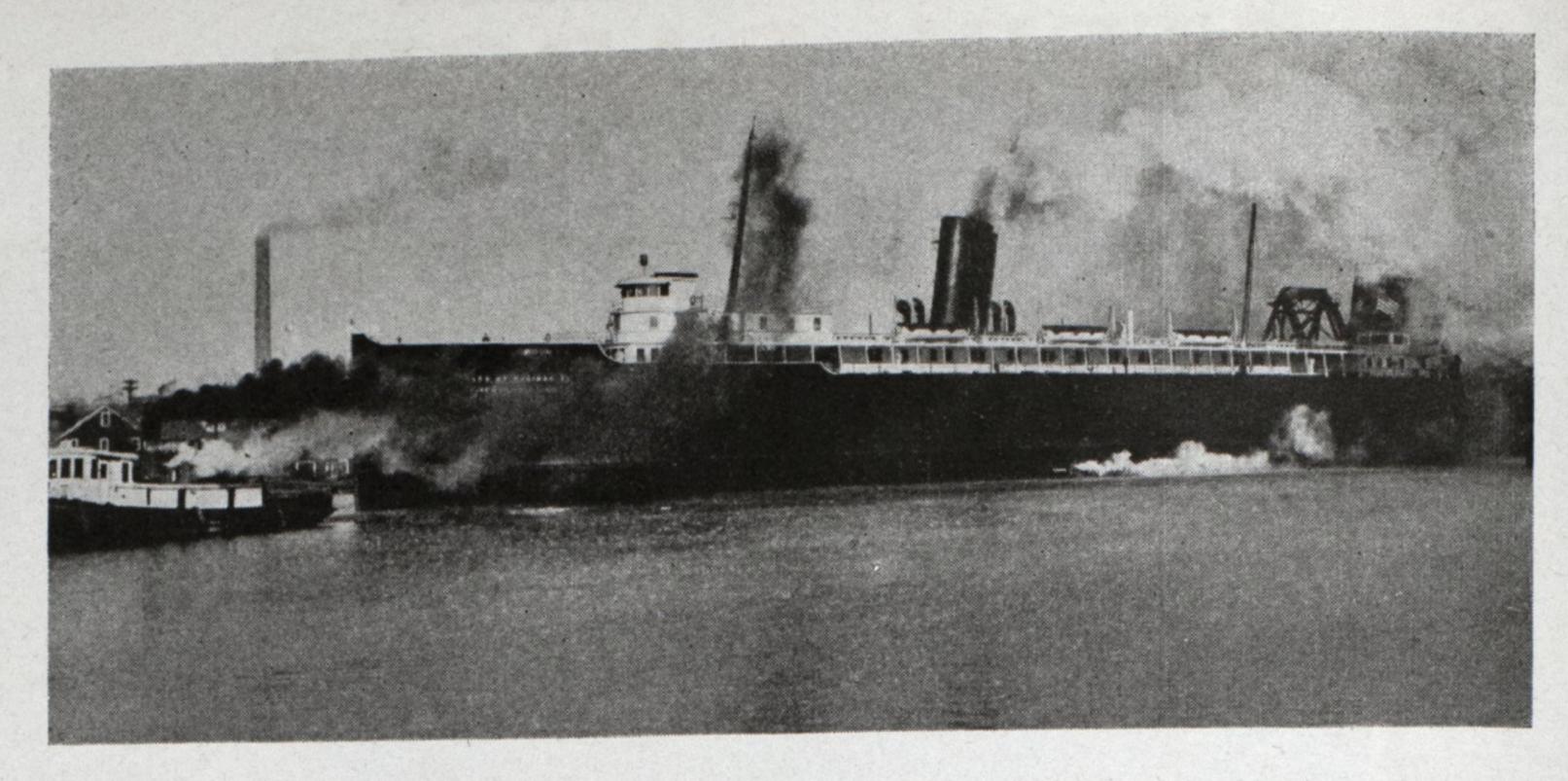
These and Other Improvements Give Simpler and Better Operation.

FOR FURTHER INFORMATION ASK FOR A FOLDER

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GENERAL DIESEL SALES OFFICES: SUITE 301, 25 W. 43rd STREET, NEW YORK CITY
131 STATE STREET, BOSTON, MASS.

PLANTS: GROVE CITY, PA., MT. VERNON, OHIO



HERE IS THE CITY OF SAGINAW 31, the turbo electric drive carferry built by us for the Pere Marquette Railway Company. When it comes to designing and building vessels our engineering organization, skilled workmen, and modern facilities guarantee satisfaction to the customer.

We design and build steel passenger and freight vessels, carferries, oil tankers, sand suckers, lighters, dredges, yachts, fire boats, tugs, derricks, scows, marine engines and boilers. At this plant you will find excellent facilities, including a 600' steel floating dry dock, for ship, engine and boiler repairs.

MANITOWOC SHIPBUILDING CORPORATION MANITOWOC, WISCONSIN

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WERE SUPPLIED TO THE

BYRD ANTARCTIC EXPEDITION

C. M. Lane Lifeboat Co., Inc. Brooklyn, N. Y.

On Board the . . .

On board the new DollarLiner, "President Hoover"... on board the new Porto Rico Liner, "Borinquen"... on board the new American Export Liner, "Excalibur"... on board the new Standard Tanker, "G. Harrison Smith"... on board the new Coast Guard Cutters, "Itasca", "Sebago", "Saranac".

In fact, on board most all of the outstanding new ships—and the older ones—you will find Paracoil equipment holding responsible positions. Paracoil Feed Water Heaters, Evaporators, Distillers, Lubricating Oil Coolers, etc., etc., have been standard marine equipment for many years. Write for bulletins.

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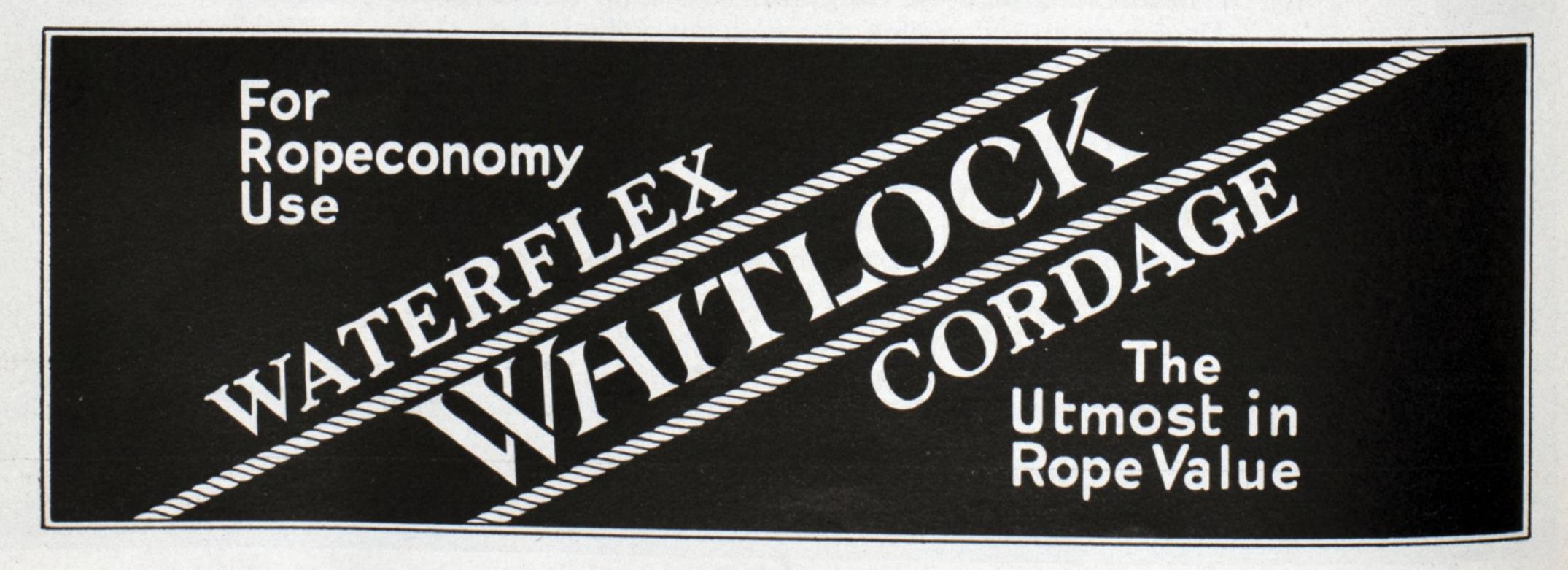
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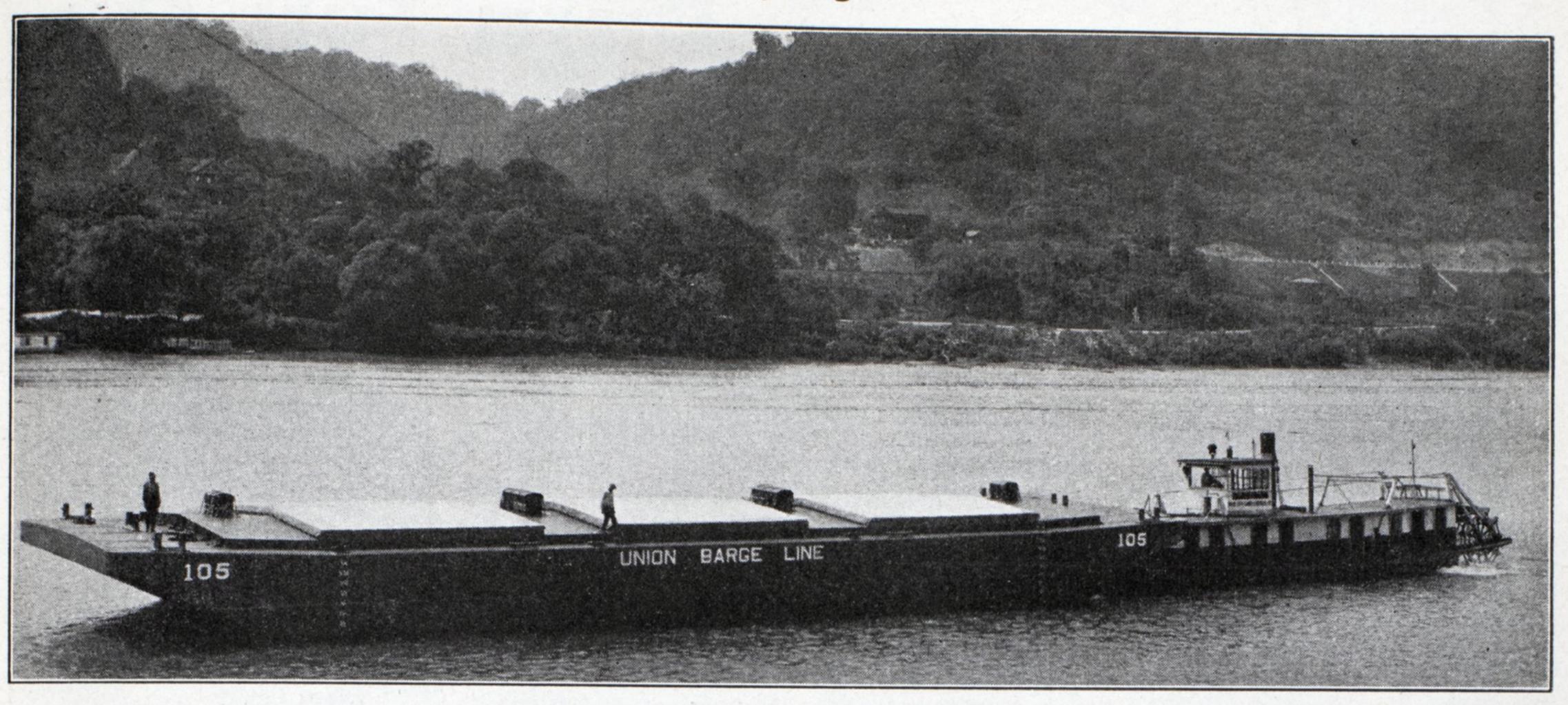
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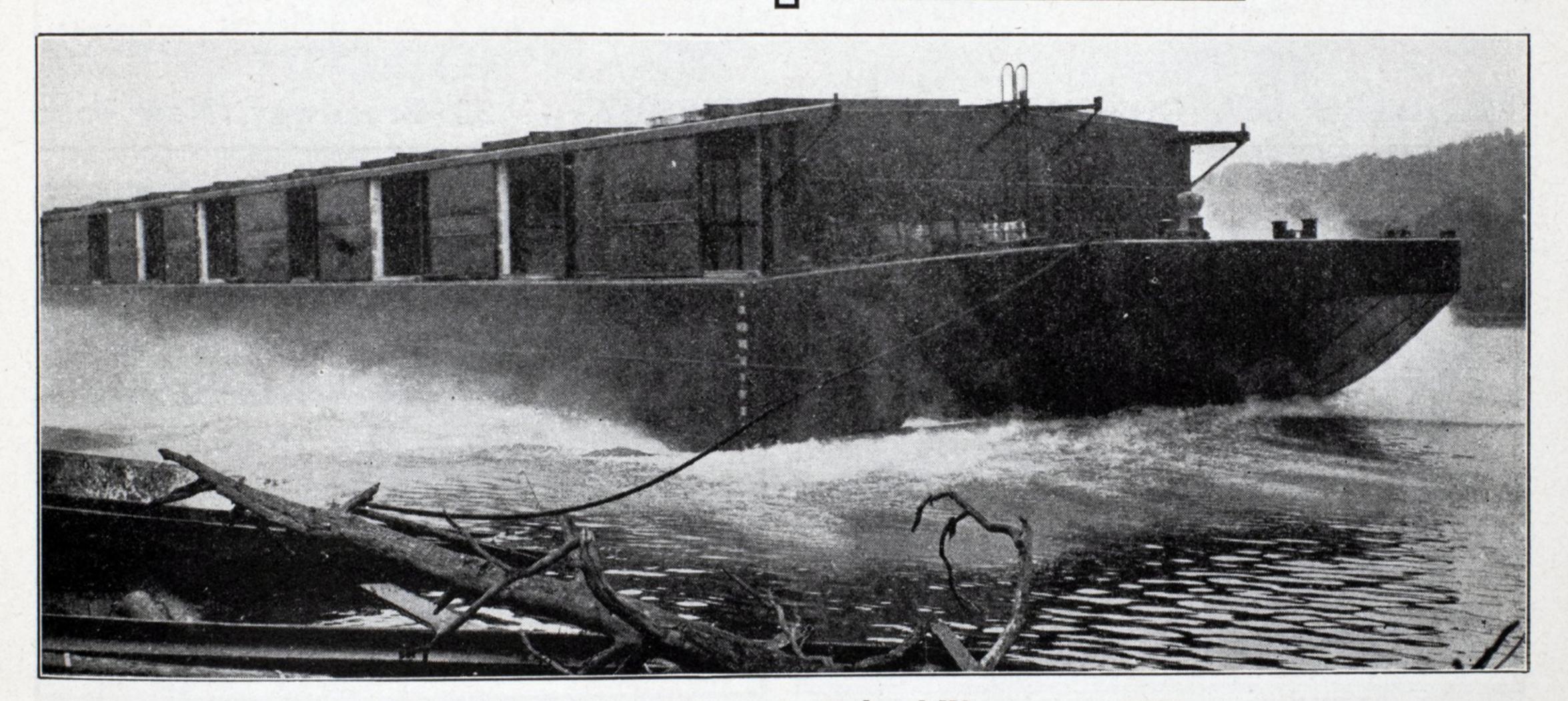
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For Twenty-Eight Years

1931



Steel Barge (Covered) for Union Barge Line



Launching of Steel Barge for Inland Waterways, 1929



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Recommended by the leading Diesel manufacturers, "Standard" Diesel Fuel Oil enjoys world wide distribution and world wide use. Facilities for bunkering with this highly refined and clean power fuel are found in every port—made available by the vast organization of the Standard Oil Company of New Jersey. Use these facilities and receive this better Diesel Fuel Oil.

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HAMBURG-AMERICAN LINE

PASSENGER SERVICES: New York to Cherbourg, Southampton and Hamburg. New York to Galway, Cobh (Queenstown), Cherbourg and Hamburg. North Pacific Ports to Hamburg, Bremen and Antwerp via Panama Canal.

PLEASURE CRUISES: Around the World, to the West Indies, Northern Wonderlands, Mediterranean.

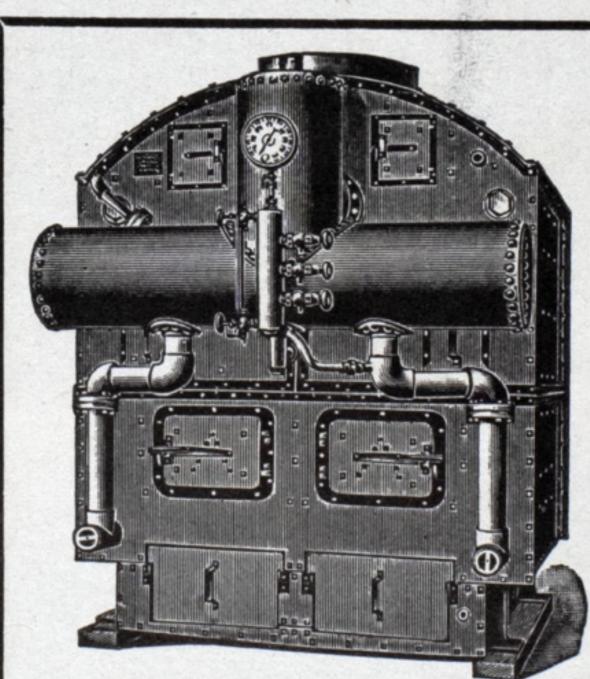
FREIGHT SERVICES: New York to Hamburg (8 days). Boston, Philadelphia, Baltimore and Norfolk to Bremen and Hamburg.

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39 Broadway

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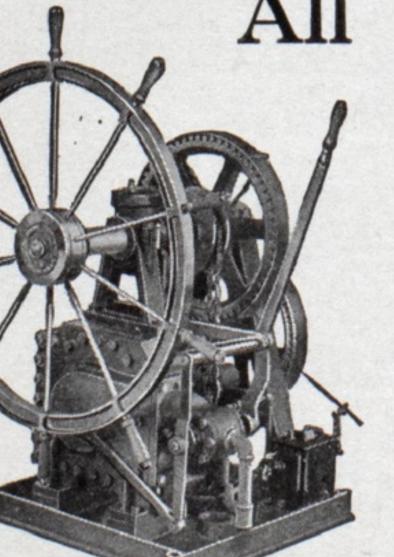


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Almy Water Tube Boiler Co.

Builders of Sectional Water Tube Boilers for all types of vessels

Providence, R. I. U.S.A.



"CS" Steering Gear

All Over the Lakes

Go into any port of consequence on the Great Lakes and you will find vessels using DAKE Steering Gears, Capstans, Windlasses or other auxiliaries. Ask the owners and you will find they give efficient dependable service, with the least expense for upkeep. DAKE Auxiliaries are all simple of construction and very compact. They require less space and very little attention. Write for information on any auxiliaries you are interested in.

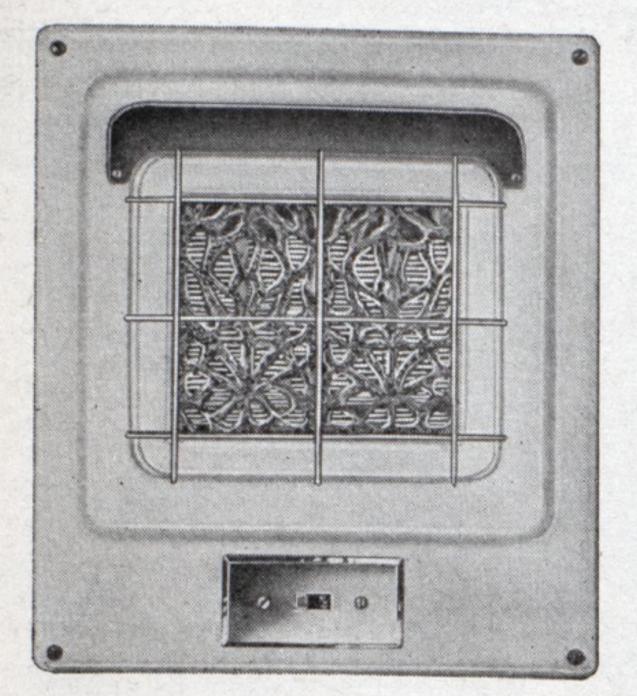
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Dake Engine Co., GRAND HAVEN, MICHIGAN



Snub Line Winch

GIVE YOUR PASSENGERS AS MUCH HEAT AS THEY WANT - - - - WHEN THEY WANT IT



Model 102A Volts 110 Rating 1000 Watts

Frame: 14" Wide—16¼" High

Body: 11¾" Wide—11¾" High—4" Deep

Give your passengers a comfortable trip that they'll rave about to their friends. It will be good advertising for your line. The RADIANT ELECTRIC HEATER enables passengers to control the heat in their staterooms to their liking—gives a glow of real hospitality.

Economical to install. Furnished in various color combinations. Costs just a few cents an hour for current.

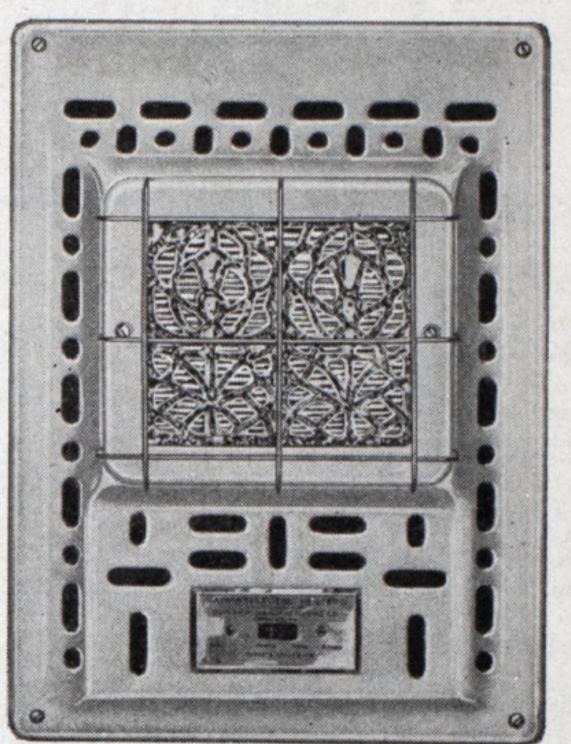
Write for Full Details - Now!

The

RADIANT ELECTRIC

HEATER

Approved by Underwriters.



Model 102B

Volts 110 Rating 1200 Watts

Frame: 143/8" Wide—19½" High

Body: 123/8" Wide—17½" High—4" Deep

SUPERIOR MANUFACTURING COMPANY

Carnegie, Pennsylvania



A complete line of structural steel sections for shipbuilding purposes, including Carnegie Beams with their wide, parallel flanges, shipbuilding channels and bulb angles, Carnegie Floor Plate in a raised pattern insuring long wear and easy cleaning, and rolled steel plates of every description.

The name "Carnegie" has been identified with steel manufacture for nearly three-quarters of a century—a good name to look for on Steel.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.



like this ship"

The experienced sea cook recognizes his strongest ally in the SHIPMATE. He likes to sign on the ship whose galley is SHIPMATE equipped because he knows he won't have a balky range to contend with just at the moment when the meal itself is demanding his entire attention. He appreciates SHIP-MATE dependableness.

THE STAMFORD FOUNDRY CO
STAMFORD CONN

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62

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Brookline, Mass.

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American Shipbuilding Co.,

Foot of W. 54th St., Cleveland, O.

BLOWERS (Motor Driven Ventilation)
Sturtevant, B. F., Co.,

BLOWERS (Turbine Driven)
Westinghouse Elec. & Mfg. Co.,
S. Philadelphia, Pa.

Hyde Park, Boston, Mass.

BOATS (Steel and Wood)

Bethlehem Shipbuilding Corp., Ltd.,

Bethlehem, Pa.

Newport News Shipbuilding & Dry

Dock Co., 233 Broadway,

New York City.

BOILERS (Marine)

Almy Water Tube Boiler Co.,

184 Allen St., Providence, R. I.

American Shipbuilding Co.,

Foot of W. 54th St., Cleveland, O.

Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.
Great Lakes Engineering Works,
River Rouge, Mich.
Newport News Shipbuilding & Dry
Dock Co., 233 Broadway,
New York City.
Oldman-Magee Boiler Works, Inc.,
36-40 Illinois St., Buffalo, N. Y.
San Shipbuilding & Dry Dock Co.,

Babcock & Wilcox Co.,

Chester, Pa.

BOILERS (Water Tube)

Almy Water Tube Boiler Co.,

184 Allen St., Providence, R. I.

Babcock & Wilcox Co., The,

85 Liberty St., New York City.

BOOKS (Technical)
Penton Publishing Co., Cleveland, O.

BRAKES (Electric)
Cutler-Hammer, Inc.,
1265 St. Paul Avenue,
Milwaukee, Wis.

BROKERS (Vessel)

Boland & Cornelius,
Marine Trust Bldg., Buffalo, N. Y.

Farley, Edward P., & Co., Inc.,
11 Broadway, New York City.

BUNKER FUEL OIL—See FUEL OIL

BURNERS (Oil)—See OIL BURNING EQUIPMENT

CABLES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co.,
46 South St., New York City.

CALCIUM CARBIDE
Union Carbide Sales Co.,
30 E. 42nd St., New York City

CALKING COTTON

Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

CAPSTANS

Bethlehem Shipbuilding Corp.,
Bethlehem, Pa.

Dake Engine Co.,
Grand Haven, Mich.

Hyde Windlass Co., Bath, Me.

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American Bridge Co.,
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Bethlehem Shipbuilding Corp., Ltd.,
Bethlehem, Pa.

CARBIC
Union Carbide Sales Co.,
30 E. 42nd St., New York City

CARBIC FLOODLIGHTS

Oxweld Acetylene Co., The,

30 E. 42nd St., New York City

CARBIDE
Union Carbide Sales Co.,
30 E. 42nd St., New York City

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River Rouge, Mich.

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Brookline, Mass.

COMPASSES (Gyro)
Sperry Gyroscope Co., The,
Brooklyn, N. Y.

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River Rouge, Mich.
Ingersoll-Rand Co.,
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Samson Cordage Works.

Boston, Mass.

Whitlock Cordage Co.,

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Long Island City, N. Y.

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33rd & Arch Sts., Philadelphia.

DEPTH FINDERS
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DIESEL ENGINES—See ENGINES
(Diesel)

DIESEL FUEL OIL—See FUEL

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Prestolite Co., The, Inc.,

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River Rouge, Mich.

Westinghouse Electric & Mfg. Co.,
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Haydenville Co., The.
Haydenville, Mass.

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Great Lakes Engineering Works,
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New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,

DYNAMOS

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Troy, Pa.

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River Rouge, Mich.

Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

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Brooklyn, N. Y.

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Great Lakes Engineering Works,
River Rouge, Mich.

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United Dry Docks, Inc.,

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Cooper-Bessemer Corp., The,
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Standard Motor Construction Co.,
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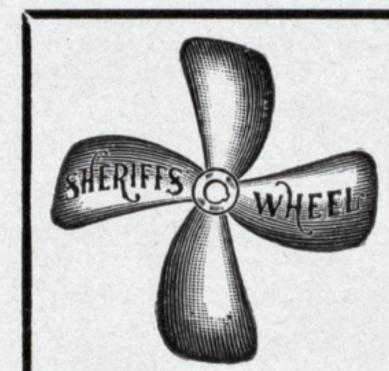
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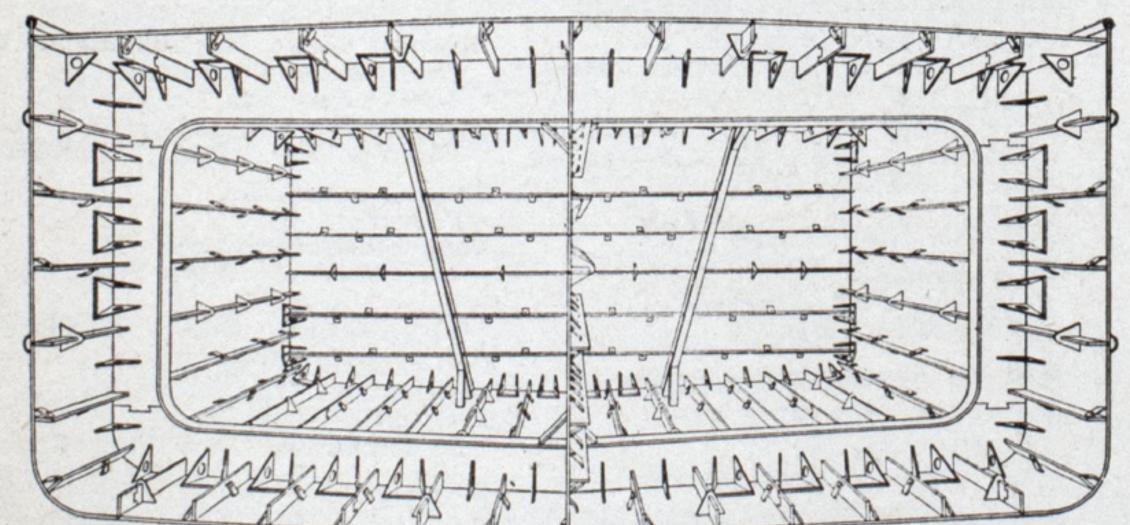
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Sun Shipbuilding & Dry Dock Co.,

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11 Broadway, New York City.

Chester, Pa.

Todd Shipyards Corp.,

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FAUCETS Haydenville Co., The, Haydenville, Mass.

FEED WATER HEATERS-See HEATERS AND PURIFIERS (Feed Water)

FEED WATER REGULATORS Babcock & Wilcox Co., 85 Liberty St., New York City.

FIRE BRICK Babcock & Wilcox Co., The, 85 Liberty St., New York City.

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FLOOR PLATES Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

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GENERATORS Diehl Mfg. Co., Elizabethport, N. J. Troy Engine & Machine Co., Troy, Pa. Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

So. Philadelphia, Pa.

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GREASE (Launching) Vacuum Oil Co., 61 Broadway, New York City

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HEATERS AND PURIFIERS (Feed Water) Davis Engineering Co., 90 West St., New York City. Griscom-Russell Co.,

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HEATING STOVES Stamford Foundry Co., Stamford, Conn.

HOISTING ENGINES Hyde Windlass Co., Bath, Me.

HOISTS (Air) American Shipbuilding Co., Foot of W. 54th St., Cleveland. Ingersoll-Rand Co., 11 Broadway, New York City

INDICATORS (Direction & Revolution) Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Helm Angle) Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Speed) Sperry Gyroscope Co., The, Brooklyn, N. Y.

ICE MACHINES-See REFRIGERATING MACHINERY

INSURANCE (Marine) Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.

LAMPS (Mazda and Arc) General Electric Co., Schenectady, N. Y.

LIFEBOATS Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y. Welin Davit & Boat Corp., 3-5 Vernon Ave., Long Island City, N. Y.

LIFE BOAT WINCHES Jacques Life Boat Winch Co., 210 Chene St., Detroit, Mich.

LIFESAVING EQUIPMENT Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT Westinghouse Electric & Mfg. Co. S. Philadelphia, Pa.

LUBRICATING OIL Standard Oil Co., of New Jersey, 26 Broadway, New York City. Vacuum Oil Co., 61 Broadway, New York City.

MACHINERY (Marine) American Shipbuilding Co., Foot of W. 54th St., Cleveland, O. Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa. Cooper-Bessemer Corp., The, Mt. Vernon, Ohio. Great Lakes Engineering Works. River Rouge, Mich. Manitowoc Ship Building Corp., Manitowoc. Wis. Maryland Dry Dock Co., Baltimore Md.

MACHINES (Sounding) Submarine Signal Co., 160 State St., Boston, Mass.

MACHINISTS American Shipbuilding Co., Foot of W. 54th St., Cleveland, O. New York Shipbuilding Co., Camden, N. J.

MAGNETS (Lifting) Cutler-Hammer, Inc., 1265 St. Paul Avenue. Milwaukee, Wis.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE EQUIPMENT Jacques Life Boat Winch Co., 210 Chene St., Detroit, Mich.

MARINE RAILWAY BUILDERS Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.

MATTRESSES Simmons Co., The, 666 Lake Shore Drive, Chicago, Ill.

METERS (Gas & Air) Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

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MOTORS Diehl Mfg. Co., Elizabethport, N. J.

MOTORS (Electric) General Electric Co., Schenectady, N. Y. Troy Engine & Machine Co., Troy, Pa. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS Ritchie, E. S., & Sons, Brookline, Mass. Sperry Gyroscope Co., The, Brooklyn, N. Y.

NAVIGATING INSTRUMENTS White, Kelvin & Wilfrid O., Co., 112 State St., Boston, Mass.

NEON Linde Air Products Co., The, 30 E. 42nd St., New York City.

NITROGEN Linde Air Products Co., 30 East 42nd St., New York City

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Jersey City, N. J.

OIL BURNING EQUIPMENT Babcock & Wilcox Co., 85 Liberty St., New York City. Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa. Coen Co., Inc., 610 S. Broadway,

Los Angeles, Cal. Sturtevant, B. F., Co., Hyde Park, Boston, Mass. OIL FOR ALL PURPOSES

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OXY-ACETYLENE APPARATUS Oxweld Acetylene Co., The, 30 E. 42nd St., New York City

OXYGEN Linde Air Products Co., 30 East 42nd St., New York City.

PASSENGER SERVICE Hamburg-American Line, 39 Broadway, New York City.

POWDERED COAL BURNERS Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

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PULVERIZED COAL BURNERS Fuller-Lehigh Co., Fullerton, Pa. Todd Shipyards Corp., 25 Broadway, New York City.

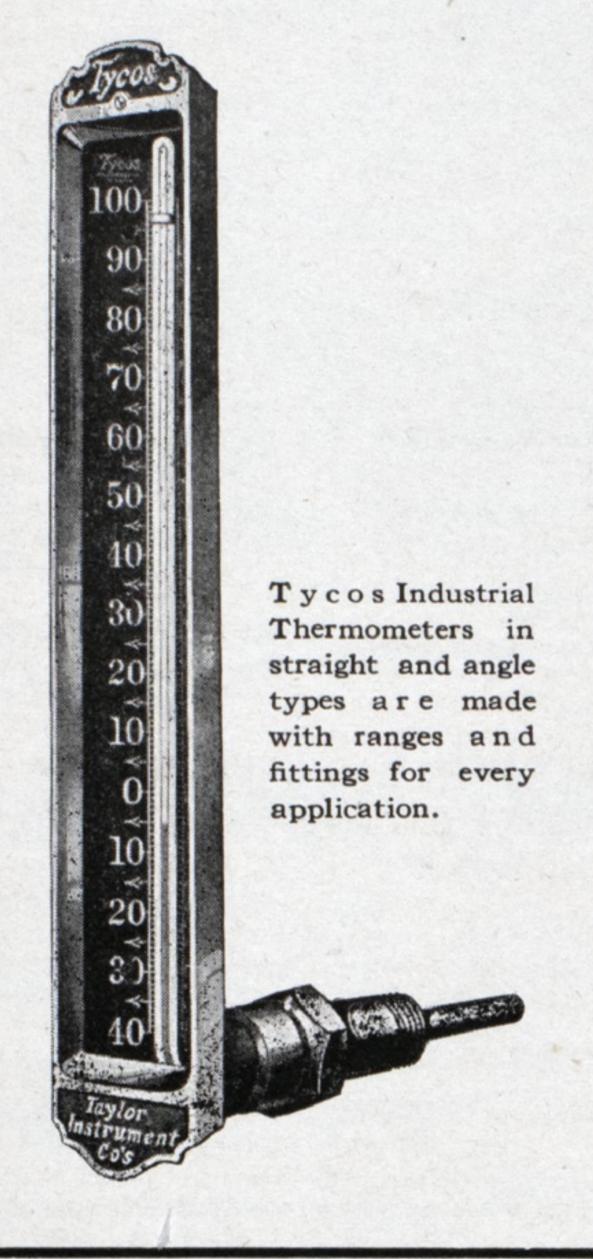
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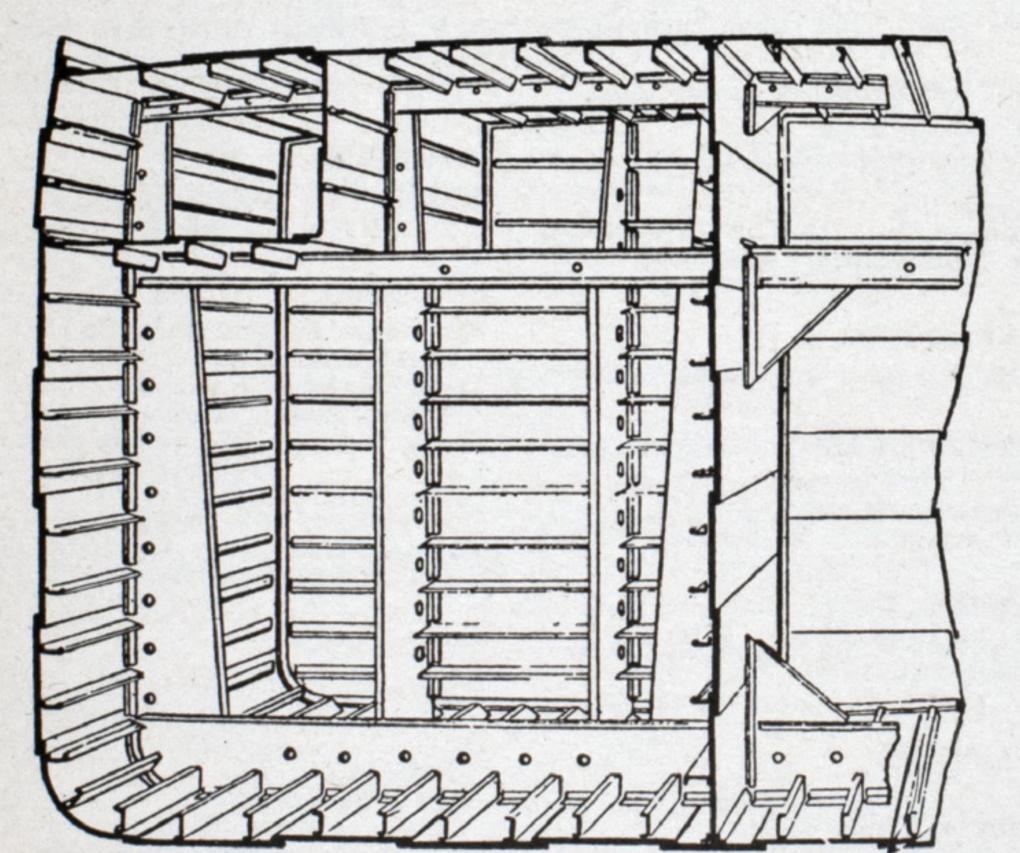
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PUMPS (Boiler Feed) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Direct Acting) Dean Brothers Co.. 323 W. 10th St., Indianapolis, Ind.

PUMPS (Fuel Oil) Coen Co., Inc., 610 S. Broadway, Los Angeles, Cal.

PUMPS (Power) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Steam) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

PUMPS (Vacuum) Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.

SYSTEMS—See PURIFICATION WATER PURIFICATION SYSTEMS

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RADIO EQUIPMENT Radiomarine Corp. of America, 66 Broad St., New York City.

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RANGES Stamford Foundry Co., Stamford, Conn.

REFRIGERATING MACHINERY Ingersoll-Rand Co., 11 Broadway, New York City

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Todd Shipyards Corp., 25 Broadway, New York City. United Dry Docks, Inc., Submarine Signal Co., 11 Broadway, New York City

REPAIRS (Turbine) Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

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ROPE OAKUM Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

RUBBER TILE Selby, Battersby & Co., 33rd & Arch Sts., Philadelphia.

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SAFETY VALVES (Marine) Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary) American Shipbuilding Co., Foot of W. 54th St., Cleveland.

SEARCHLIGHTS (High Intensity) Sperry Gyroscope Co., The, Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc) General Electric Co., Schenectady, N. Y. Sperry Gyroscope Co., The, Brooklyn, N. Y.

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SHIPBUILDERS American Shipbuilding Co., Foot of W. 54th St., Cleveland. Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa. Charleston Dry Dock & Machine Co., Charleston, S. C. Great Lakes Engineering Works, River Rouge, Mich. Manitowoc Ship Building Corp., Manitowoc, Wis. Maryland Dry Dock Co.,

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11 Broadway, New York City.

SHIP STABILIZERS Sperry Gyroscope Co., The, Brooklyn, N. Y.

SIGNALS (Submarine) 160 State St., Boston, Mass.

SOUNDING MACHINES Submarine Signal Co., 160 State St., Boston, Mass.

SPRINGS (Box, Bed) Simmons Co., The, 666 Lake Shore Drive, Chicago, Ill.

SPUN OAKUM Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

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STEAM GAGES Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

STEAM TRAPS Davis Engineering Co., 90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES Hyde Windlass Co., Bath, Me.

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STOKERS Babcock & Wilcox Co., The, 85 Liberty St., New York City.

STORAGE BATTERIES—See BATTERIES

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TRANSMISSION (Rope)-See ROPE (Transmission)

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TRUCKS (Dump) Clark Tructractor Co., Battle Creek, Mich.

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VENTILATORS Allen Corp., 1040 14th St., Detroit, Mich.

WATER PURIFICATION SYSTEMS Griscom-Russell Co., 285 Madison Ave., New York City.

WELDERS (Electric Arc) Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

WELDING & CUTTING APPA-RATUS (Oxy, Acetylene, Oxy-Gas)

Oxweld Acetylene Co., The, 30 E. 42nd St., New York City

WELDING GAS Prestolite Co., The, Inc., 30 E. 42nd St., New York City WELDING SUPPLIES Oxweld Acetylene Co., The, 30 E. 42nd St., New York City

WHISTLES Star Brass Mfg. Co., 53 Oliver St., Boston, Mass

WINCHES Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa. Dake Engine Co., Grand Haven, Mich. Hyde Windlass Co., Bath, Me.

WINCHES (Life Boat) Jacques Life Boat Winch Co., 210 Chene St., Detroit, Mich.

WINDLASSES American Shipbuilding Co., Foot of W. 54th St., Cleveland. Bethlehem Shipbuilding Corp., Ltd.. Bethlehem, Pa. Dake Engine Co., Grand Haven, Mich. Hyde Windlass Co., Bath, Me.

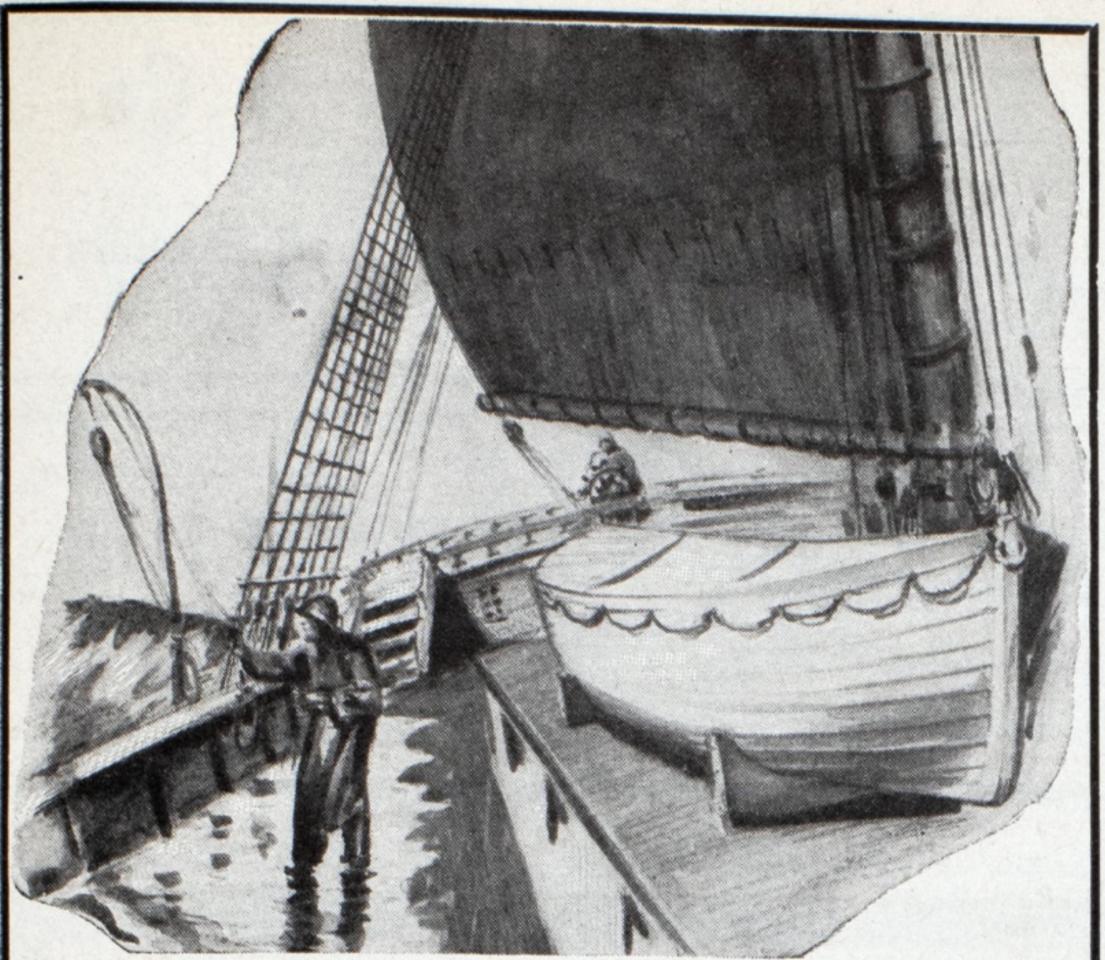
WIRELESS MESSAGE SERVICE Radiomarine Corp. of America, 66 Broad St., New York City.

WIRELESS SETS AND APPARATUS Radiomarine Corp. of America, 66 Broad St., New York City.

WORKBOATS Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

Chester, Pa.



"Then Ho for the swash of the briny wash"

In heavy weather, a tight deck is just as important as tight seams. Poor deck caulking means ruined cargoes, wet sleeping quarters, food spoilage and many annoyances.

Caulk your deck with

STRATFORD DAKUM

Make it as tight as your garboard.

Stratford Oakum is the world's best. It is the most economical to use. It takes less labor to caulk or spin, and "stays put" whether in bottom, side or deck. Stratford Oakum is well finished, well tarred, clean and elastic enough to keep the seam tight always.

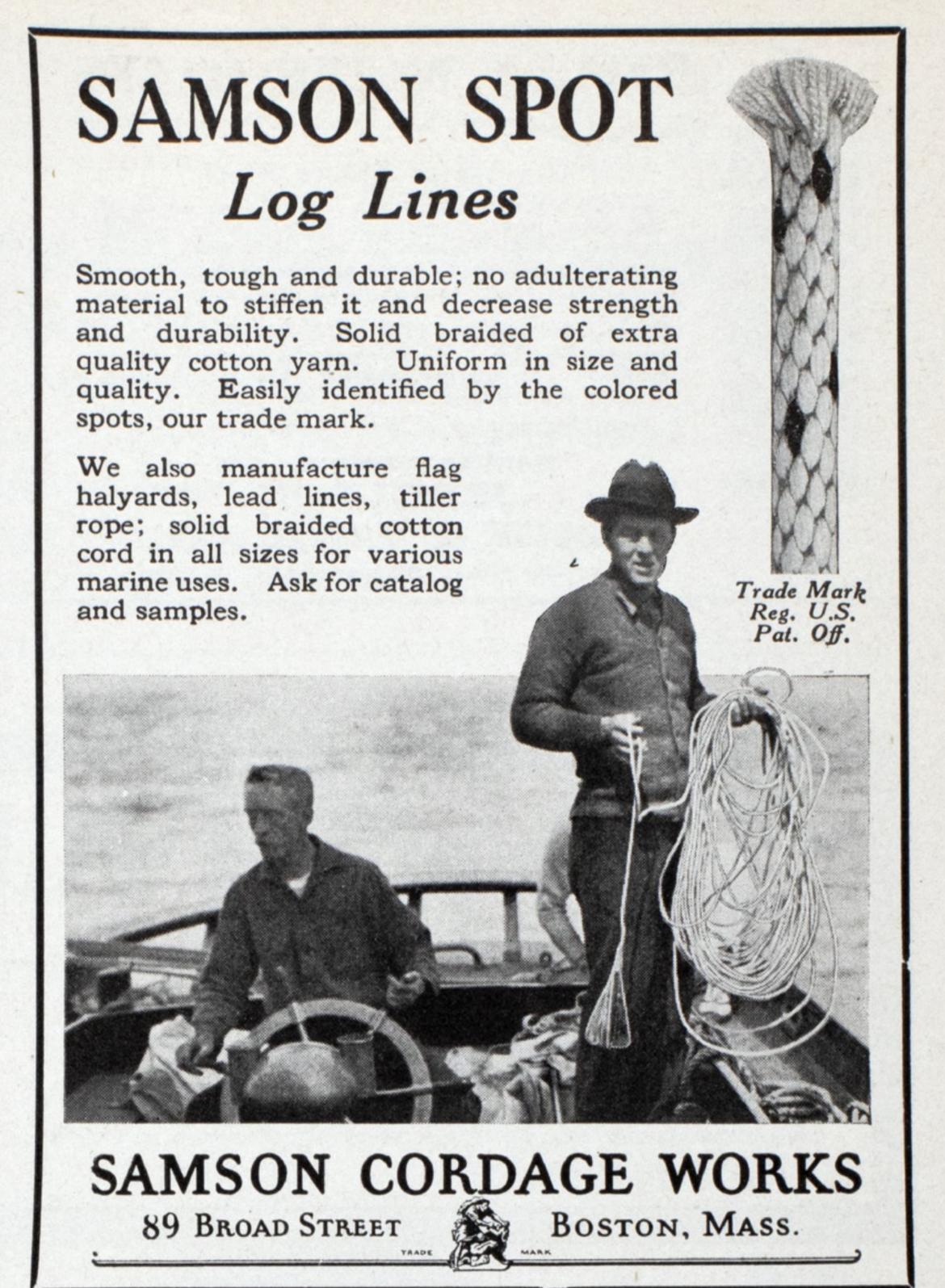
Be sure to use Stratford Oakum.

George Stratford Oakum Company

Jersey City, New Jersey

Also Manufacturers of Cotton Wiping Waste

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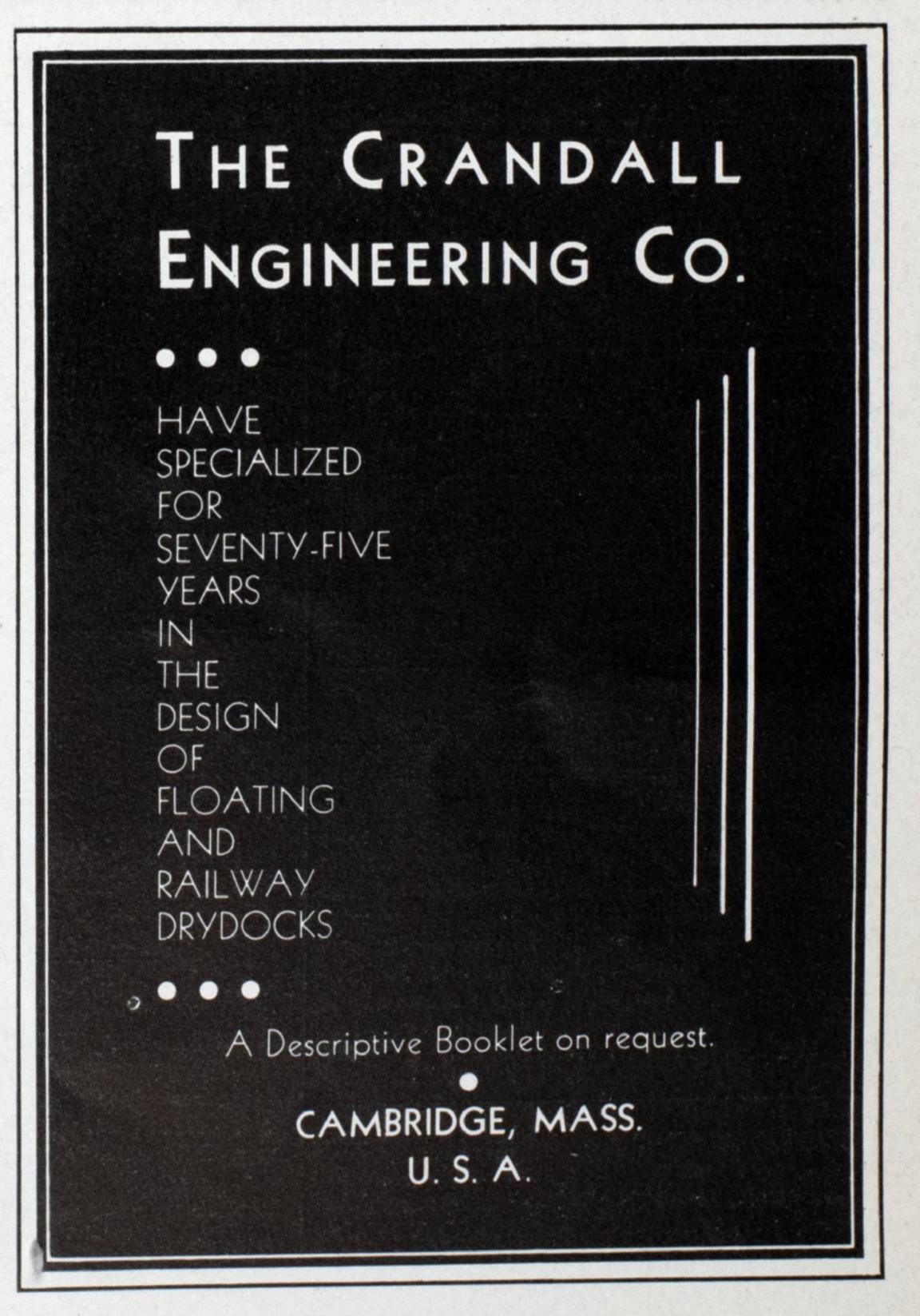


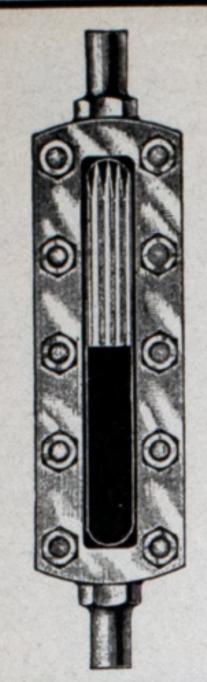


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If you have a passenger ship, freighter, tanker, tug or any other floating property or marine equipment for sale advertise it in Marine Review.

The rate is \$3.00 for a minimum advertisement of 30 words. Additional words, 10c each.





REFLEX WATER GAGES

Used on all types of boilers by all the Principal Navies of the world

"The Water Shows Black"

ADVANTAGES: Quick and reliable observation of the water level. Safe, sure and durable at high pressure. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with WATER the Reflex Gage always appears BLACK. When empty it instantly shows WHITE. No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus

JERGUSON
GAGE & VALVE CO.

WINTER HILL, SOMERVILLE, MASS.

Edward P. Farley & Co.

Incorporated

Steamship Owners, Agents and Brokers

11 Broadway-New York

John J. Boland

Adam E. Cornelius

BOLAND & CORNELIUS

VESSEL OWNERS AND BROKERS
Marine Insurance Agents

Marine Trust Building BUFFALO, N. Y.

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For Sale and Miscellaneous Advertisements
10c per word—minimum advertisement—\$3.00

Six words must be added for box address.

To insure insertion, advertisements must reach us by the 10th of the month.

Help Wanted Advertisements
6c per word-minimum advertisement-\$3.00

Position Wanted Advertisements
4c per word-minimum advertisement-\$1.00

Please have remittance accompany order.

For Sale

FOR SALE—WOODEN STEAMER LANGELL Boys, capacity 500,000 ft. lumber on 12'6 draft. In first class condition, now in winter quarters at Saginaw. Apply to Carrollton Steamship Company, Saginaw, Michigan.

Position Wanted

POSITION WANTED AS ENGINEER (DIEsel) ferry yacht or tug. Ten years experience. Will go anywhere. Best of references. Write or wire H. C. Stringer, Hathorn, Miss.

POSITION WANTED: AS ASSISTANT TO executive, junior executive, or representative of steamship company, vessel brokers, forwarding company, shipbuilding company, or manufacturer of marine equipment. Young man, single, thirty years old, graduate leading school of commerce, four years with Great Lakes passenger and package freight line, member family of steamship operators. Have traveled United States, Canada, European and Mediterranean countries and willing to go anywhere in those countries. Available immediately. Box 419, MARINE REVIEW, Cleveland, Ohio.

AT LIBERTY FOR COMING SEASON. First class steward, all around cook. On the Great Lakes since 1905. Go anywhere. Wife and waitress. Bill DePuy, Elk's Club, Tulsa, Okla.

For Sale

FOR SALE STEAM TUG "MONITOR"

70' x 15' x 9' draft, 45-tons gross, oak hull rebuilt 1918, main engine two-cylinder, vertical non-condensing, size 16 x 18, equipped with Scotch Marine boiler, working pressure 150 lbs. Blake steering engine, pumps, complete equipment. Price \$3000. Detailed specifications furnished on request. St. Lawrence River Power Company, Massena, New York.



ON ACCOUNT OF DISCONTINUING AMUSEment Park for subdivision will sell two steel Passenger Steamers—S.S. Bedell, length 104 feet, breadth 28 feet, draft 8 feet, 700 passengers. S.S. Chicora, length 124 feet, breadth 33 feet, draft 8 feet, 1000 passengers. Both in first class condition. Details on application— Erie Beach Park, Ltd., 402 Walbridge Building, Buffalo, N. Y.

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FOR SALE: MARINE ENGINES AND boilers of all sizes; light draft wooden and steel tug boats for sale or charter; derrick boats, deck scows and lighters for sale or charter. Cowles Towing Co., Buffalo, N. Y.

FOR SALE OR LEASE—FLOATING DANCing pavilion and restaurant. K E U K A.
Only one of its kind on the Great Lakes. Most
modern and up-to-date equipment, for information write Wolverine Steamship Co., Boyne
City, Michigan.

FOR SALE STEEL TOW BARGE

"Swederope" 227' long, 38' beam, 19'6" deep. Detroit Sulphite Transportation Co., 9125 W. Jefferson Ave., Detroit, Mich.

Wanted

WANTED: STEEL TUG, APPROXIMATEly 100 ft. long, 24 ft. beam, 750 H. P. Address box 421, MARINE REVIEW, Cleveland, Ohio. **Baltimore City Office** 310 E. Lombard St. Plaza 1935

New York Office No. 1 Broadway **Digby 2173**

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BALTIMORE, MD.

Drydocking, Shipbuilding and Ship Repairs of All Kinds The Most Modern Shops in Baltimore 2—9000 Ton Floating Drydocks

Floating Machine Shop

DAY and NIGHT SERVICE

Plant Phones: Curtis 0500 - 0501 - 0502 - 0503

Kelvin & Wilfrid O. White Co.

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Navigational Equipment Contracts a Specialty

New York and Montreal

Oldman-Magee Boiler Works, Inc.

Boilers, Tanks, Stacks, Structural Work and Castings

Boiler Repairing Promptly Attended to Day or Night ELECTRIC WELDING MARINE WORK A SPECIALTY

Works: 36-40 Illinois Street

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Star Brass Mfg. Co.

53 Oliver Street -::- Boston, Mass. MANUFACTURERS OF

Accurate "Non-corrosive" Pressure and Recording Gauges, Revolution Counters, Marine Clocks.

Dead Weight Gage Testers.

Marine, Safety and Relief Valves for all pressures.

Marine Whistles and Sirens.

Extra Heavy Renewable Globe, Angle and Check Valves.

Star Outside Spring Steam Engine Indicators.

HIGH GRADE THROUGHOUT SPECIFY AND ORDER THE BEST.

Branches: CHICAGO PITTSBURGH NEW YORK

MEAN BROS. MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex Piston Type & Plunger

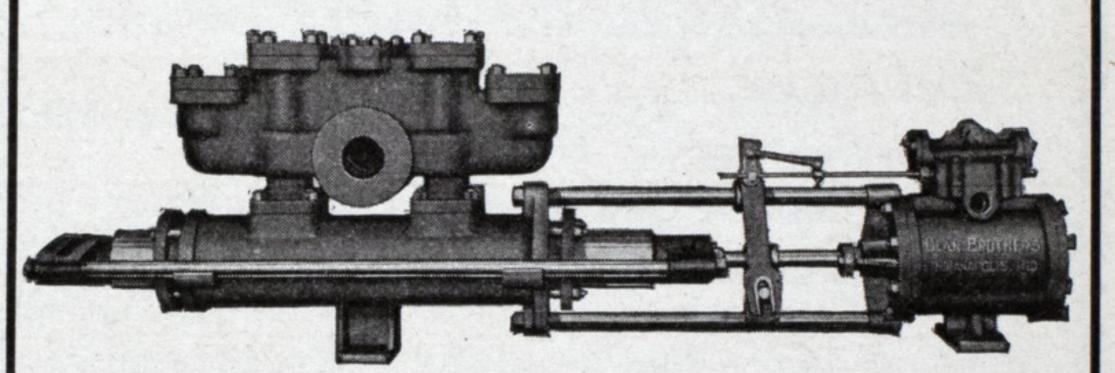


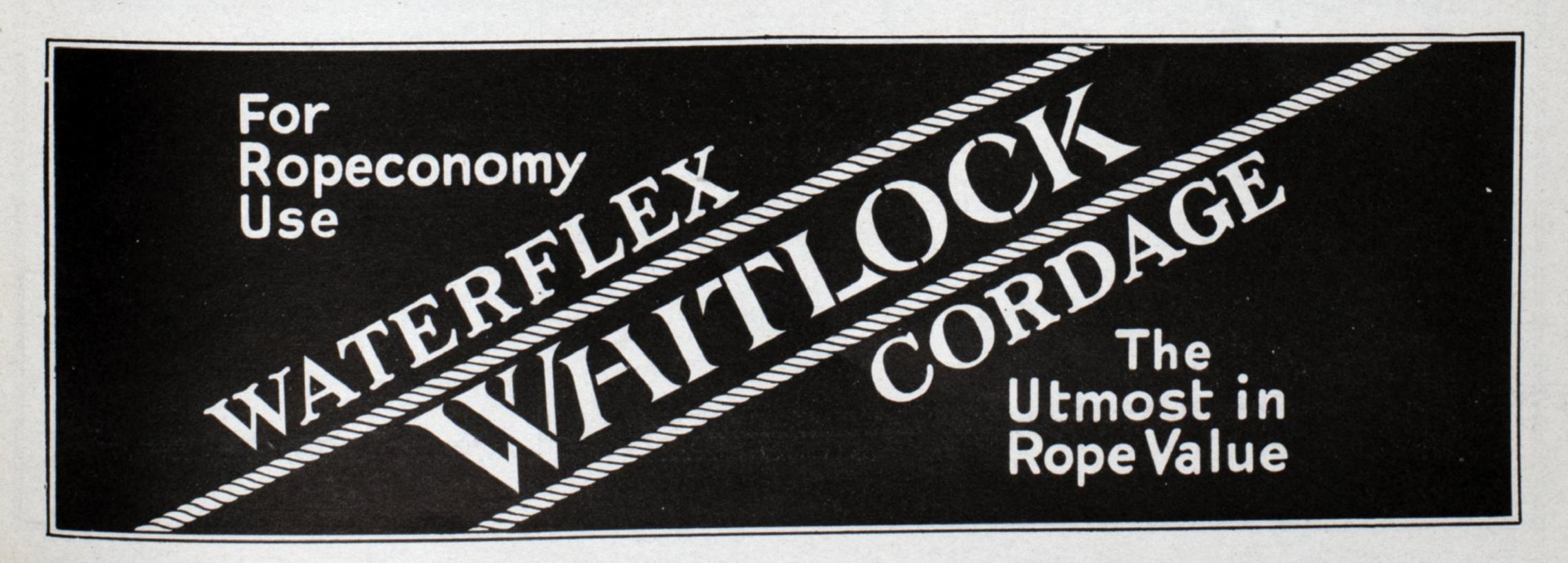
Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

ESTABLISHED 1869

DEAN BROS. COMPANY

323 WEST TENTH ST.

|NDIANAPOLIS |ND.



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More Earnings For Owners • of Cargo-Carrying Craft

TRUSSWELD—minimum investment

for maximum carrying capacity

OWNERS of oil tankers, lighters, derricks, car floats and barges are adopting the new TRUSSWELD system of construction for craft carrying liquid cargo in the hold or dry cargo on deck.

Owners approve the economy of craft so constructed for first cost, maintenance and operation. For shoal water use, equal carrying capacity is attained with less draft. Less power is required for propelling or towing.

These advantages are secured by maximum carrying capacity for minimum hull weight. The TRUSS-WELD system eliminates all riveting and practically all heavy members such as keels, ribs, beams and

DECK PLATE

BOTTOM PLATE

Midship section showing internal structure of angle iron members running fore and aft, athwartship and vertical, electrically welded to each other at intersections and to the skin of the hull. The enlargement in the circle shows a typical junction of three members

even frames. It produces a stronger and more rigid craft of greater capacity for its dimensions.

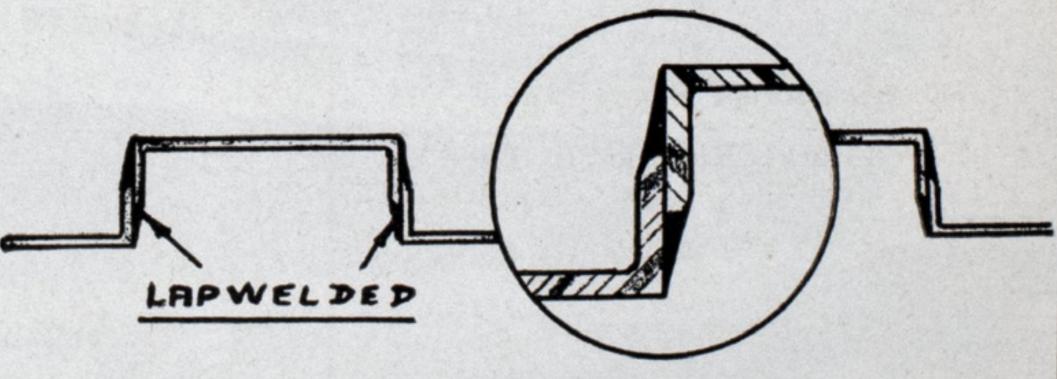
The superiority of TRUSSWELD over all other systems of steel construction is being demonstrated in vessels operated by some of the world's largest owners of tanks and barges. For certain types of craft, TRUSSWELD may often replace wood construction where cost is a primary consideration.

The REVERSE CHANNEL system lapwelded—no butt welds

For carrying dry cargo below decks, the new REVERSE CHANNEL system assures great strength and rigidity of hull construction; maximum carrying capacity for minimum hull weight; economy of first cost, maintenance and operation.

United Dry Docks, Inc.—exclusive Atlantic Coast licensee of Kjekstad patented TRUSSWELD and REVERSE CHANNEL Systems of tank and barge construction—is ready to figure, build and guarantee.

THE REVERSE CHANNEL SYSTEM



Enlargement in circle shows the lapwelding method

UNITED DRY DOCKS

INCORPORATED

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DIgby 4-0500

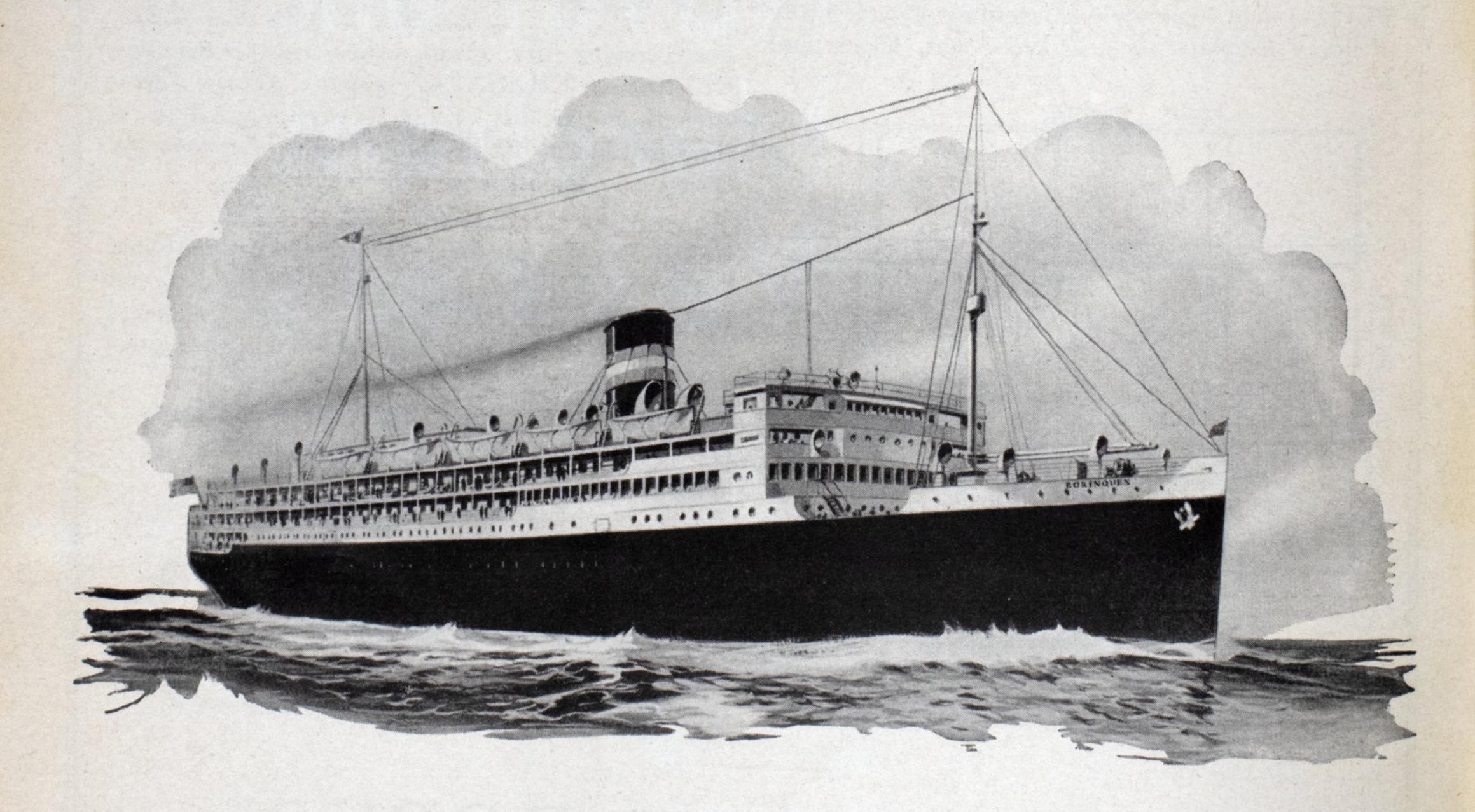
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The Boringuen and Modern Steam

The Borinquen, luxurious flagship of the New York-Porto Rico Lines, enters regular service assured of true economy through the use of Modern Steam . . . steam at 400 pounds pressure and 600° F. total temperature.

The operators assert with confidence that the Boringuen ranks with the finest vessel of her size afloat from the standpoints of safety, comfort, luxury and speed.

This product of American engineering skill is equipped with Babcock & Wilcox Marine Water-tube Boilers, Superheaters, Feed Water Regulators, Oil Burners, and B. & W. No. 80 Firebrick.

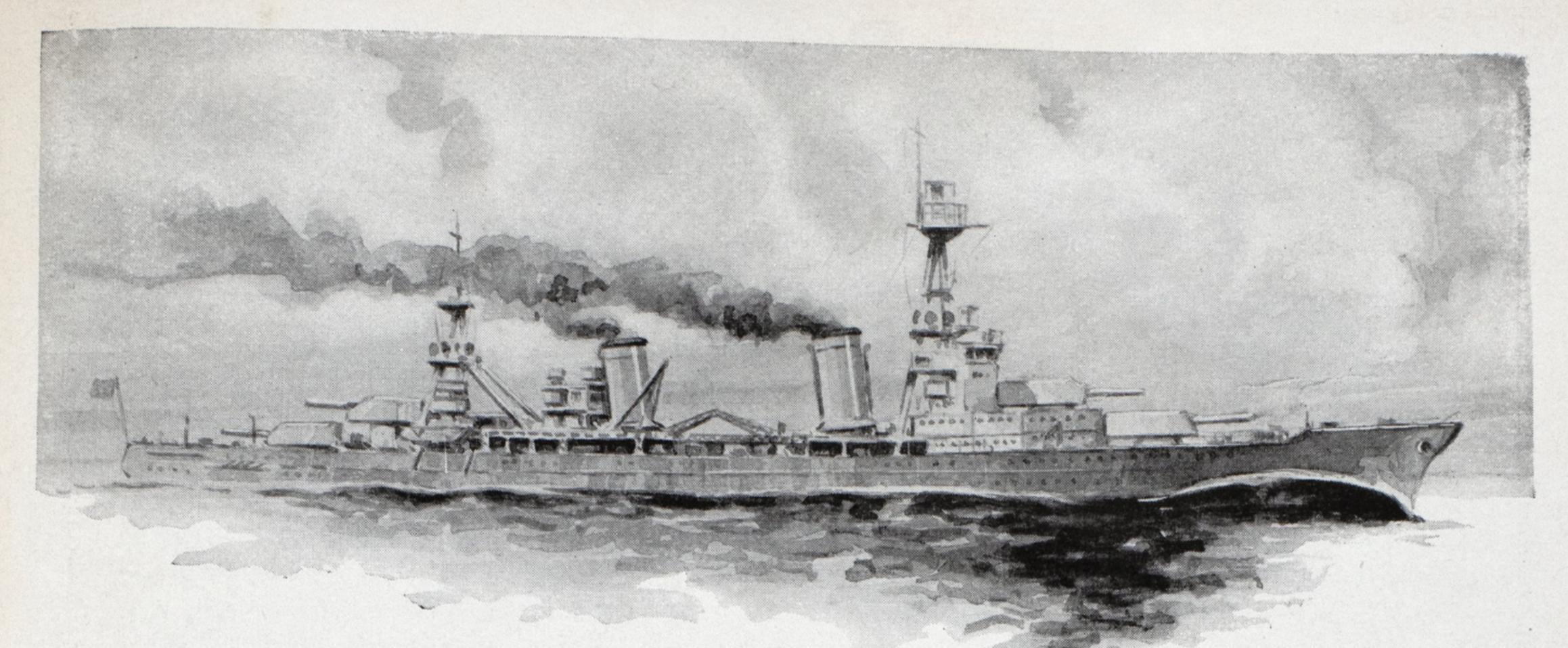


THE BABCOCK & WILCOX COMPANY 85 LIBERTY ST.

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MARINE REVIEW-March, 1931

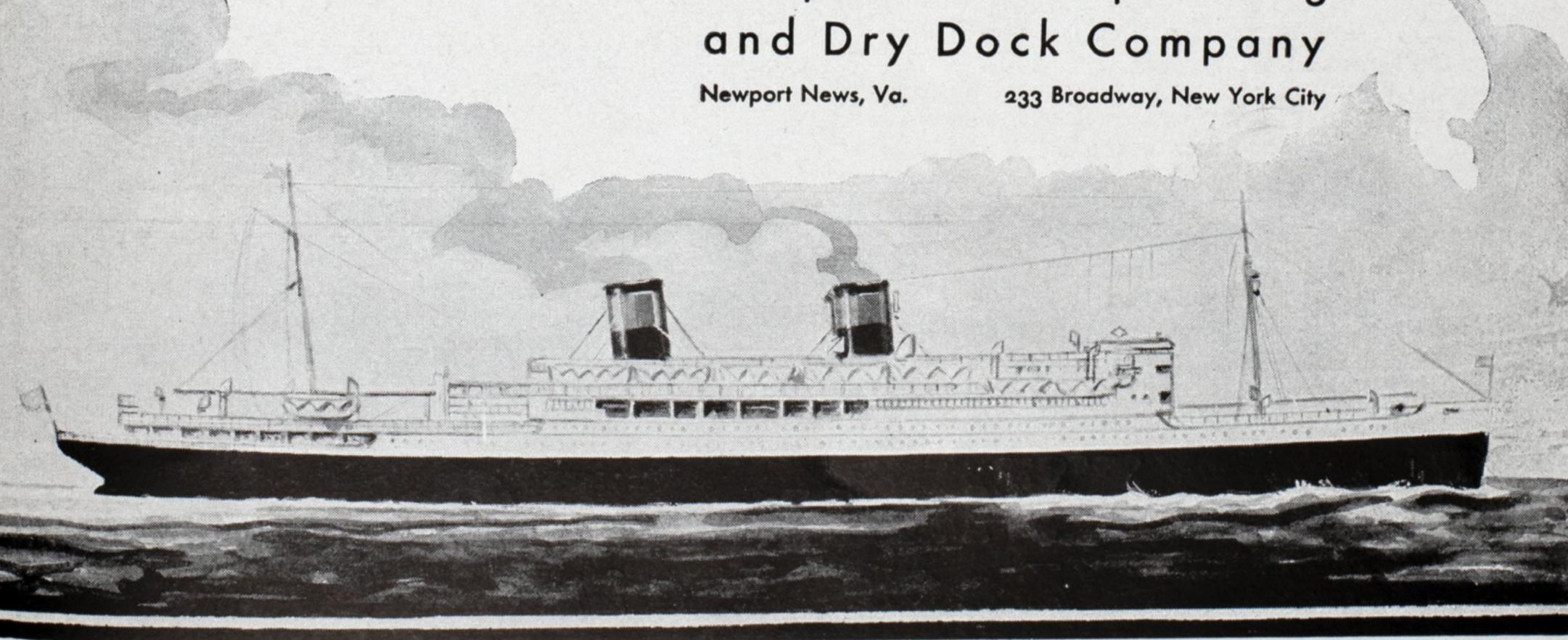
NEW YORK, N.Y.

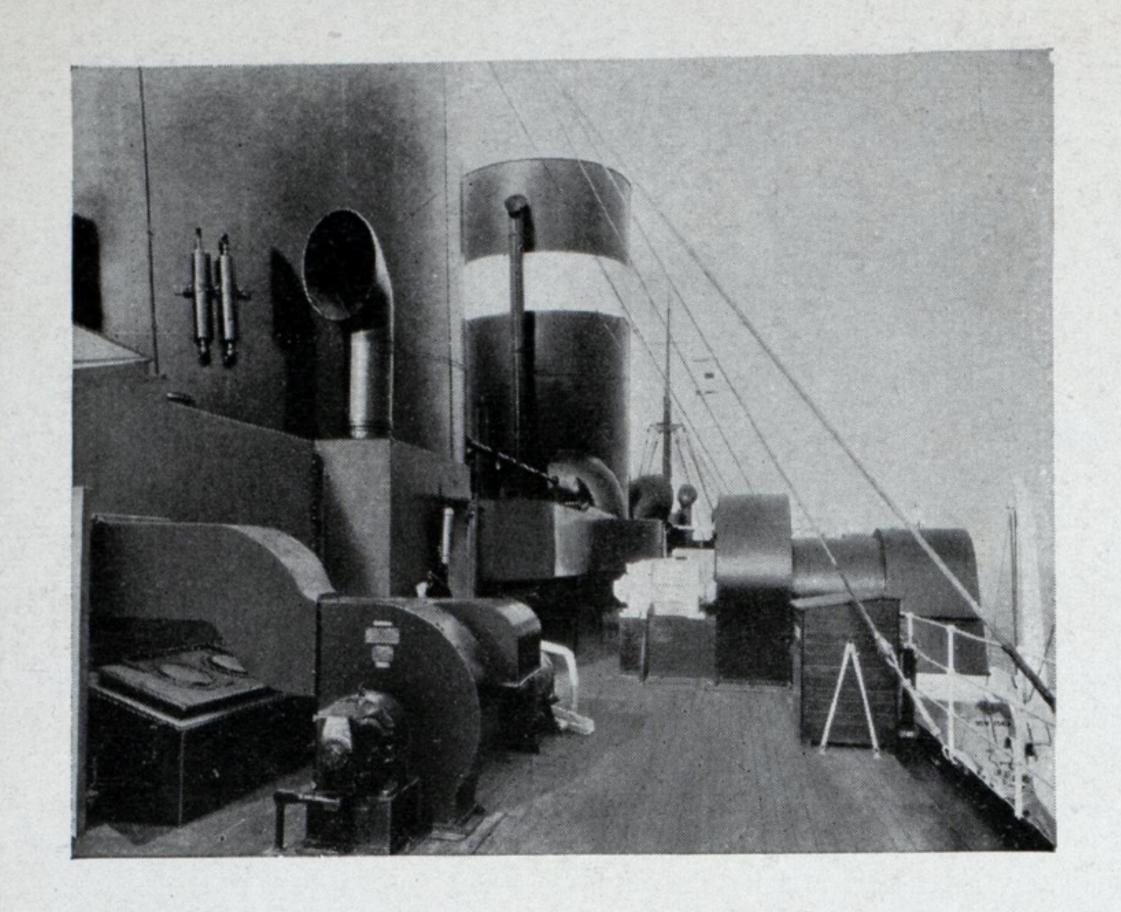


Builders of Naval and Merchant Vessels

"SHIPS OF CHARACTER"

Newport News Shipbuilding





Do They Sleep Soundly?

When your passengers get up in the morning are they refreshed from a good night's sleep? If they have been sleeping on the boats equipped with Sturtevant ventilating fan, the chances are that the fresh cool sea air has filled them with new zest and vigor.

Sturtevant Ventilating equipment has been the standard by which all other systems have been measured for over fifty years. They are both quiet and efficient. We put into them the experience gained from sixty-six years of building air handling equipment.

A request will bring you complete information on this very important subject of marine ventilation.



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Marine Equipment

Heating and Ventilating
Equipment—

Mechanical Draft Equipment— Turbines—Motors—Blowers—

Ventilating Sets—Heaters— Generating Sets—Exhausters Gasoline and Steam Engines

If You Want The Best Specify

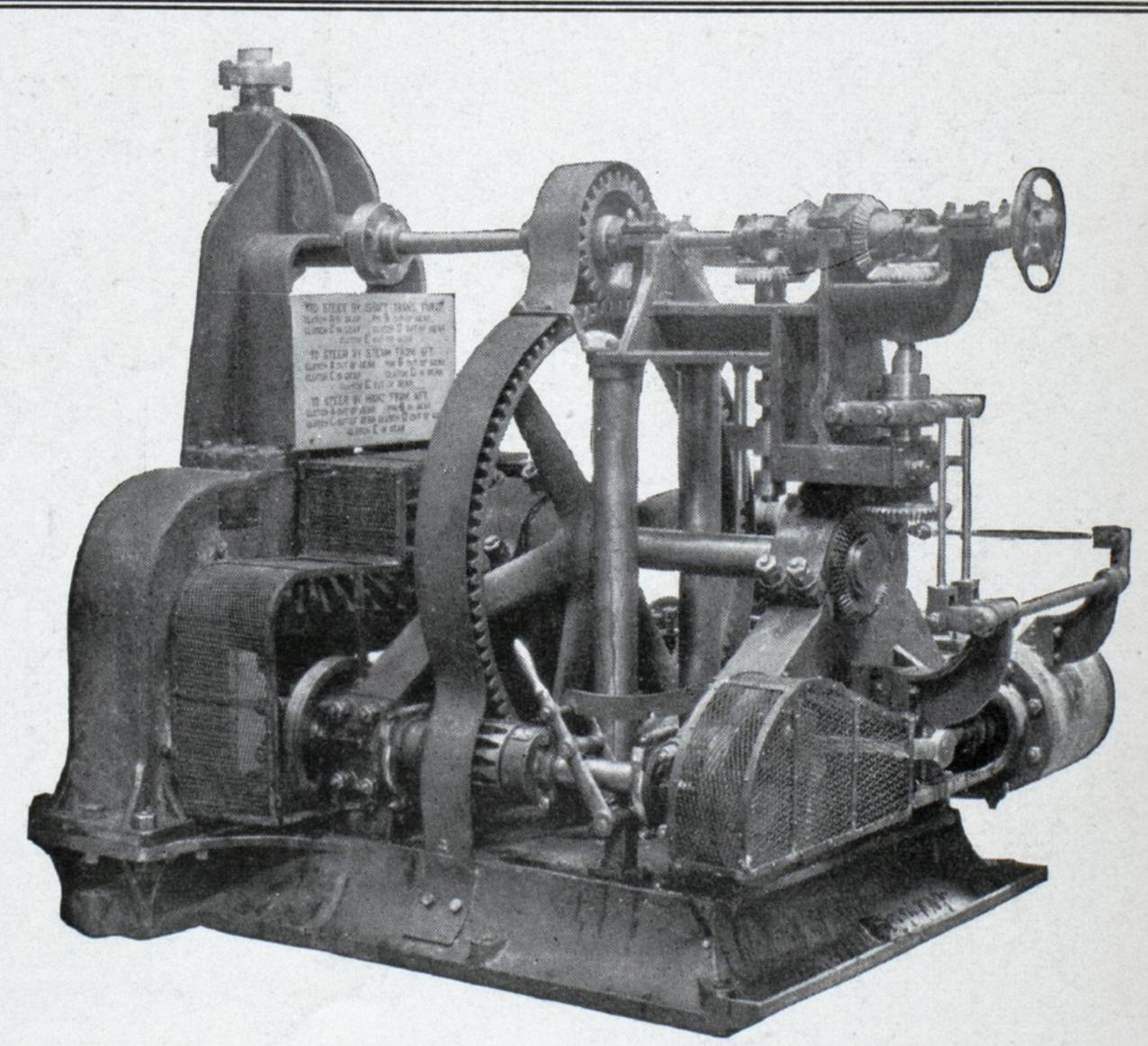
Hyde

- S. S. "A. F. HARVEY" owned by Pittsburgh Steamship Co. and built by Great Lakes Engineering Works.
- S. S. "B. F. AFFLECK" owned by Pittsburgh Steamship Co. and built by Toledo Shipbuilding Co.
- S. S. "S. T. Crapo" owned by Huron Transportation Co. and built by Great Lakes Engineering Works.

These three fine new boats are all equipped with

Hatch Winches

Quadrant Type
Steering Gear
Spur Gear Windlass
Mooring Winches
Hatch Winches



HYDE Quadrant Type Steering Gear

Hyde

Windlass Company Bath, Maine